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THE SELECTION OF ANÆSTHETICS, SEQUENCES AND METHODS

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ALTHOUGH there are more than one thousand substances which may be used as anæsthetics, experience has shown that only a few of these are safe enough for routine use. These are nitrous oxide, ether, chloroform, ethyl chloride, and the cocaine derivatives used as local and spinal analgesics.

No single anæsthetic will answer all requirements. In some clinics, owing to economic considerations or personal enthusiasm on the part of the surgeon, one particular method is used to the exclusion of all others and is pointed out as the best for all cases. This conclusion is open to criticism; for the good results obtained are due not to the anæsthetic in itself but to the expertness in administration gained by constant practice with one method, and in the hands of anæsthetists whose experience is limited, the results do not compare at all favourably with those obtained when the anæsthetic is chosen according to the requirements of each particular case. For example, in the Mayo clinic ether by the open drop method, and in the Crile clinic nitrous oxide with oxygen, are advanced as ideal anæsthetics for routine use. They probably are in these clinics; but in the report of the Committee on Anæsthetics of the American Medical Association, ether given by the drop method is placed sixth on the list of anæsthetics in point of safety, while the consensus of opinion among a large number of

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clinics using nitrous oxide throughout America is that only about one third of all the cases are suitable for nitrous oxide with oxygen.

We should remember, too, that in some cases the best results are obtained not from any one of these drugs or methods alone but from judiciously combining one with another or substituting one for another during the operation.

It would be foolish to lay down a law concerning each anæsthetic and its use for any particular class of patient or operation, because the experience of the anæsthetist, the facilities for administering anæsthetics, and the special features of the individual case must influence a choice. A thyroidectomy which might be done with advantage under ether by the drop method in the Mayo clinic, would rightly be performed under a combination of nitrous oxide with oxygen and local anæsthetic in the Crile clinic; and the same case would be done more satisfactorily under chloroform by a surgeon more familiar with chloroform than with either of the other anæsthetics.

There are, however, certain indications for each anæsthetic.

Nitrous oxide alone is indicated in minor operations of very short duration in patients over five years of age, who are not suffering from myocarditis, arterial sclerosis, or any grave obstruction to the respiratory tract. Nitrous oxide combined with oxygen is an ideal anæsthetic for all toxic patients, for patients suffering from pulmonary tuberculosis, renal lesions, or diabetes, and for patients who have had distressing after-effects from some other anæsthetic on a former occasion, particularly if the surgeon is satisfied with the minimum amount of relaxation of the muscular tissues, and if he has learned to operate gently, realizing the light grade of anæsthesia produced by this agent. Preliminary medication with morphine and atropine, or some variation of this treatment, should always be given half an hour before operation. The contra-indications are the same as for nitrous oxide alone, except that the presence of oxygen lessens the danger from high blood pressure and from asphyxia. Young children, and robust and alcoholic adults do not take this anæsthetic well.

Ether is indicated in all major operations where good muscular relaxation is desired, and where the patient's general condition is good and no contra-indication, such as diseased lungs, kidneys, liver, or pancreas, is present. Ether is particularly well borne in patients suffering from heart disease where compensation is established. Preliminary medication with morphine and atropine is advisable. Owing to the unpleasant features associated with

the induction of anæsthesia by ether alone, it is better to produce unconsciousness with nitrous oxide and oxygen, gradually to add ether until full anæsthesia is obtained, at the same time diminishing the inducing agent, and finally to give ether only.

Chloroform is often used for the induction of anæsthesia, for minor operations, and for operations in very young patients. It is a powerful anæsthetic and may be resorted to with advantage in alcoholic patients who do not relax well under ether, and in the reduction of dislocations and fractures where great muscular relaxation is required, and where there is no handling about any of the sympathetic nervous centres. It is a favourite anæsthetic for obstetric patients, although ether is now coming into favour. Many operators prefer chloroform anæsthesia for operations upon the brain and about the head and neck, because of the absence of profuse bleeding. It is a dangerous anæsthetic for operations deep in the epigastrium and about the sphincters, because an overdose may be taken before the symptoms are recognized. Unlike ether, where the narcotic effect begins to diminish at once upon withdrawal, with chloroform the narcotic effect goes on and deepens after withdrawal of the anæsthetic—sometimes for many minutes.

Preliminary morphine and atropine should not be given with chloroform, because they greatly increase the already powerful narcotic action of this drug, and if untoward symptoms should arise, too profound depression of the respiratory centre occurs and resuscitation is difficult.

It must be remembered that, although both nitrous oxide and ether have some slight toxic effect upon the blood corpuscles and upon the protoplasm of the viscera, chloroform, if given over any period of time and to any great depth of anæsthesia, breaks up the blood corpuscles to a much greater extent, produces profound visceral changes, and sets free toxins which cause a grave and sometimes fatal condition known as secondary chloroform poisoning.

Ethyl chloride, which is a very quickly acting and unpleasant anæsthetic, with a good deal of the asphyxiant action of nitrous oxide, was formerly considered intermediate in safety between ether and chloroform; but within the last few years the statistics in England have shown it to be even more fatal than chloroform. Its chief use at present is as a local anæsthetic, although it is also used as a general anæsthetic for short minor operations and for inducing anæsthesia preliminary to the administration of ether.

Local analgesia may be used in many cases where the patient will allow of operating during the conscious state, and the surgeon has learned to avoid painful manipulation and traction which may set up pain impulses producing shock more serious than that caused by a general anæsthetic. In this connexion it is safe to state that we will use more and more in the future a combination of local with light general anæsthesia, under which the patient is oblivious to what is going on and is not on the watch for pain impressions from the site of operation, which gives the surgeon a better chance to manipulate the tissues in the operative field.

Spinal analgesia is indicated for operations below the umbilicus in patients with very grave contra-indications to a general anæsthetic, where great relaxation and freedom from sensation are necessary. It is particularly valuable in traumatism of the lower half of the body, because it cuts off all the shock impulses and prevents their passage through the spinal cord. A great deal has been written for and against this method for routine use, but in most clinics its use is confined to the indications named.

It must not be forgotten that it is sometimes desirable to substitute one of these agents for another. For instance, when a patient shows evidence of failing vitality during operation, it is a good thing to change from ether or chloroform to nitrous oxide with oxygen; or it may be necessary in a case which has been started under local anæsthetic to supplement it with a small amount of general anæsthetic.

The age of the patient enters to a certain extent into the choice of an anæsthetic. Although anæsthetics may be safely borne by patients of all ages, some agents are unsuitable for young children. Gas, for instance, does not control muscular movements and readily produces asphyxia; and ether, especially in induction, is badly taken on account of its irritating local action. Old people generally take ether or chloroform well. Owing to their weak musculature, they require less anæsthetic than middle-aged patients.

It has already been stated that heart lesions, except those of the most severe type, do not contra-indicate the use of a general anæsthetic, especially ether.

For anæsthetizing patients with diseased kidneys, the tendency seems to be more and more in favour of ether as opposed to chloroform, but nitrous oxide with oxygen is to be preferred, because these patients sometimes have pulmonary complications after operation.

When we consider the choice of an anæsthetic according to

the site of operation, we must remember that nitrous oxide gives poor relaxation, that ether relaxes well in most cases, and that chloroform is the most potent of all anæsthetics; but that they are poisonous in the same order; and that chloroform, particularly in operations where vital centres are interfered with, may produce a rapidly fatal result. Furthermore, nitrous oxide and ether produce a great deal more bleeding than chloroform. This, however, is considered an advantage by some operators, because it lessens the danger of secondary hæmorrhage. Nitrous oxide, being followed by less post-operative nausea and vomiting, causes less strain on abdominal wounds. Ether produces hypersecretion of mucus and saliva with the danger of aspiration pneumonia, and is often followed by severe retching and vomiting.

The selection of anæsthetics for operations about the head, neck, and thorax, depends very largely upon the methods of administration available. For instance, in an operation upon the tongue, if some means of administering ether by insufflation is not at hand, chloroform is indicated.

The most commonly used sequences are gas and oxygen followed by ether, chloroform followed by ether, and ethyl chloride followed by ether. The nitrous-oxide-ether sequence is not dangerous, and overcomes all unpleasant impressions in the mind of the patient concerning the induction, while it has the advantage that anæsthesia is quickly produced, and the struggling and hypersecretion sometimes encountered when ether alone is used for induction, are abolished. In the use of the chloroform-ether sequence, if struggling or respiratory irregularities should arise, chloroform should be abandoned at once and ether substituted until the breathing becomes regular and struggling ceases. The same is true of the ethyl-chloride-ether sequence.

The best way to administer nitrous oxide is to give it under slight positive pressure combined with whatever percentage of oxygen may be desired. Instruments for this purpose are manufactured and have been brought to a high degree of efficiency.

Ether may be given drop by drop upon an open mask, a method which has the great advantage of immediate safety but which often does not produce perfect relaxation, and in some cases is followed by post-operative pneumonia; or it may be given by the closed or rebreathing method, which requires more skill and which, in the hands of a novice, may be very dangerous; or it may be given by insufflation, that is, a volume of air mixed with the required proportion of ether vapour is blown under slight

pressure directly into the patient's trachea or pharynx. Insufflation overcomes the mechanical obstruction in the patient's mouth, and takes the great load off the respiratory muscles which is caused by inhalation ether anaesthesia. Intratracheal insufflation prevents aspiration of foreign material into the lungs, and gives quiet regular breathing, good colour, normal pulse and blood pressure, absence of venous engorgement, and quick, uneventful recovery. It is the best way to give ether.

Ether may also be given intravenously by directing a mixture of from 5 to 10 per cent. ether in normal saline into the patient's veins. This method is not growing in favour.

Colonic ether anaesthesia is produced either by pumping the vapour mixed with air into the colon, or by introducing a mixture of olive oil with ether high into the colon. The latter method, suggested by Gwathmey, is now being tried with considerable success in many of the New York hospitals, and is especially useful for operations about the head and neck.

Chloroform may be given drop by drop upon an open mask or through some dosimetric apparatus. Dosimetric instruments are not reliable when they depend upon the variable factors of the patient's respiratory rate and volume; but when a measured quantity of chloroform and air is given by the insufflation method, they are very accurate.

Mixtures of nitrous oxide and ether are given in a closed inhaler under slight pressure, using the gas apparatus already mentioned. Mixtures of chloroform and ether should never be given in a closed inhaler.

Ethyl chloride is given by the closed method in small measured capsules of 3 and 5 cc. capacity. When used for continuous anaesthesia, it is given like chloroform.

Local analgesics, the best of which is probably novocaine, are given by hypodermic injection into the area of operation or into the nerve trunks going to the field of operation.

Spinal analgesia is produced by injecting into the spinal canal 5 per cent. tropacocaine after it has been mixed in the syringe with spinal fluid. In order to avoid the ascent of the anaesthetic toward the medulla, great care must be taken in the posturing of the patient.

A well equipped hospital should have a choice of the anaesthetic agents already mentioned, and should be provided with instruments for their administration and with anaesthetists proficient in their use, so that after careful study of each individual

case the most desirable anæsthetic or anæsthetic sequence and method of administration may be used, and may be changed, if necessary, during the operation. If the operator has not all of these anæsthetics at his command, or if he is dependent upon unskilled anæsthetists, he has at least a choice of ether and chloroform and their combinations.

CONCLUSIONS: 1. It is advisable to have several anæsthetics at our disposal, because in many cases some one of them or a combination or sequence of them will offer decided advantage to the patient.

2. In hospital work proficient anæsthetists and suitable apparatus should be provided, so that full advantage may be taken of the best methods, sequences, and combinations.

3. If the choice is limited, and there are no grave contraindications, that anæsthetic should be chosen with which the anæsthetist has had the most experience.

*Discussion**

Dr. Stewart: What practice does Dr. Nagle follow concerning the use of chloroform?

Dr. Nagle: I use chloroform for the induction of anæsthesia in very young patients, for anæsthesia in minor operations and in operations upon patients with pulmonary tuberculosis where no gas-oxygen is available, in obstetric operations up to the time the child is born, in the reduction of fractures and dislocations where great relaxation is necessary, as a sequence to ether in alcoholic and muscular patients who are not sufficiently relaxed, and often in operations about the head and neck.

I use the method described by Dr. Stewart, paying particular attention to the respiration, and always substitute ether when any irregularity arises, until smooth breathing has been reestablished.

I have abandoned the use of the Vernon Harcourt inhaler, because it depends upon the patient's respiratory rate and volume for its dosimetry, and because on the two occasions when I saw bad results from chloroform, this inhaler was used.

Concerning the statistics of chloroform administration, I notice that the extremely low death rate for nineteen years quoted by Dr. Stewart was for a period when no severe intra-abdominal

* See also the discussion on Dr. Stewart's paper, p. 1064.

operations were performed. I doubt if the same figures hold good in the present day of severe major operations.

Dr. Hunter: What anæsthetic does Dr. Nagle choose for diabetic cases and for cases with acetonuria?

Dr. Nagle: Local, spinal, gas-oxygen anæsthesia.

Dr. Primrose: Dr. Nagle's suggestions are advisable for a professional anæsthetist but do not go in sufficient detail into the requirements of a surgeon operating outside a hospital.

Dr. Nagle: Outside a hospital a surgeon has at least a choice of ether and chloroform. If he is doing a grave abdominal operation, where he cannot give a good deal of attention to the patient's general condition, he will do well to give ether by the drop method, but if he is used to employing chloroform, and the operation does not involve any vital centres, he may give chloroform under his own supervision, because it is easier to administer. This ease of administration is the reason why so many men use chloroform in preference to ether, in spite of the fact that they are taught that ether is safer. If the surgeon has a competent anæsthetist, he will use ether to advantage in the large majority of cases.

CHLOROFORM ANÆSTHESIA

BY JOHN STEWART, M.B., LL.D.

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I HAVE a vivid recollection of the consternation and dismay which spread through the Edinburgh Royal Infirmary one day in 1877 when it became known that a patient had died there from chloroform, the first case in nineteen years.

Vivid also is my recollection of the way in which Mr. Chiene spoke of it. "Now," he said, "there will be another. I cannot tell you why. These things never come singly. It is like the suicides from the Dean Bridge, if one happens another soon follows and a special policeman must be set to watch there for some time." He was right. In a very short time there was another, and I believe a third case occurred before the year was out. Mr. Chiene's words implied a belief in some psychic element in these phenomena, and, as I hope to show, he was right.

The man had been chloroformed in his bed in the ward, then lifted into the "basket" and carried, as was our custom, by four students to the operating theatre. The way led through a long dim corridor echoing with the sound of many feet. The student who was giving the chloroform could not hear the patient's breathing nor see his face very clearly, indeed I was told that the towel on which the chloroform was poured lay on the man's face all the way. When he was lifted on to the table he was dead.

I have told this story to illustrate the safety of chloroform if given in the right way, and by that way I mean the Edinburgh method, or I should say, what was the Edinburgh method when I was a student, the method of Simpson, Syme, and Lister.

From its first introduction in 1847 chloroform had been given in Edinburgh by the open method, poured or sprinkled on a towel or piece of lint, and with satisfactory results. Dr. Snow, the eminent authority on anæsthetics in London, had at an early date demonstrated that there were "two essentially different ways in which chloroform may kill, viz., by a direct sedative action on the

heart when the chloroform is in a large proportion to the air, and by a suspension of the respiratory functions while the heart is still acting, when the chloroform is largely diluted." He determined a safe and efficient percentage and devised an inhaler to regulate the proportion of chloroform and air. By experiment Lister showed that the percentage of chloroform vapour inhaled by a patient anæsthetized in the ordinary Edinburgh method was practically within the limits of safety determined by Snow. It was evident then that the essential point in giving chloroform was to watch the respiration, for this would afford the earliest indication of overdose, and the Edinburgh rule was to see that the respiration was unobstructed and unembarrassed and to give chloroform freely. In London where the crucial point of Snow's experiments seems to have been overlooked there was a dread of primary cardiac paralysis, the first care of the chloroformist was the pulse and the action of the heart, and it happened with painful frequency that the earliest intimation of cardiac mischief was a sudden failure of the heart, generally and quickly fatal.

It seems amazing that in two cities only four hundred miles apart such an extraordinary difference should be found. In the London hospitals chloroform was administered by a professional anæsthetist, with an ingenious apparatus, studying the heart and pulse with meticulous care, behind him an array of tragic fatalities, and before him the dread of a coroner's inquest. In the Royal Infirmary in Edinburgh it was given by a student whose sole apparatus was a towel and a pound bottle of chloroform, who never troubled about the patient's heart and did not feel his pulse, and who approached his task with cheerful and unhesitating confidence. And yet, in Edinburgh chloroform was proverbially safe, in London notoriously dangerous. Of course there were explanations, some very far fetched. It was thought, for instance, that the national beverage might have some influence, that beer might predispose to chloroform mortality, while whiskey strengthened man's heart. There are two explanations. One is that where in a hospital chloroform is always given by a professional anæsthetist the students have no opportunity of acquiring that personal experience which alone will give them courage and confidence in using it when they engage in practice.

The chief explanation is that there is a right and a wrong way of giving chloroform, and that the Edinburgh way was the right way. Results tell. If the London method resulted in a mortality of many cases every year and if the Royal Infirmary of Edinburgh

can point to nineteen consecutive years without a death, it is evident there is something wrong in the London method. There was something wrong with the case I have narrated. It is evident the Edinburgh rule, well epitomized by Mitchell Banks as "Plenty of air and plenty of chloroform", was not followed. The hapless man with a towel saturated with chloroform lying on his face while he was carried down the corridor may very likely have had an overdose of chloroform, he certainly could not have had plenty of air. The first duty of the chloroformist, a vigilant care for the respiration, was impossible under the conditions, and this explains how the successful record of nineteen years was broken, and the dismay and distress with which the event affected us was a striking testimony to the confidence in chloroform which we had acquired. I am quite aware that this claim of nineteen years of unbroken success may be received with incredulity if not with derision and I shall return to this when I come to present a few statistics.

As to the next case, which Mr. Chiene's prophetic soul foresaw, there may be a different explanation. There may have been a psychic element. The patient may have heard of the fatal case and have been agitated, and worse still, the student may have been nervous. How often I have seen and suffered from the nervous chloroformist! Without the courage to give chloroform freely, without the self-control to attend strictly and only to the respiration, the nervous chloroformist is constantly pinching or pricking the patient's skin to find if he is unconscious, raising the towel or mask to look at the pupil or test the corneal reflex, surreptitiously feeling the pulse, doing half a dozen things instead of attending to one, he does not give enough chloroform, and what the patient does get he gets irregularly. Timidity is as dangerous as recklessness. The chloroformist must not be one who

"Either fears his fate too much
Or fears it not at all."

He may be cautious, he must be bold. Fifty years ago experience had taught that a timorous and hesitating anaesthetist was a source of danger, and to-day we have physiological demonstration why this is so. Levy has shown that the cause of death under chloroform is ventricular fibrillation and that too light an anaesthesia and intermittent administration contribute to this condition. So that I believe it is a fair claim that if the first patient died from too much chloroform the second may very well have died from having had too little. A noticeable fact brought out at coroners'

inquests is the frequency with which it is said that only a very small quantity of chloroform had been given. Another fact is that very nearly one half of chloroform fatalities occur during trivial operations, the sort of cases in which vigilance is apt to be relaxed.

In 1888, Surgeon-Major Lawrie, Residency surgeon at Hyderabad, impressed by the continuous chloroform mortality reported in England and convinced from long experience of the safety of chloroform given by the Edinburgh method, organized a chloroform commission. Its investigations supported the teaching of the Edinburgh school but they were not accepted in England, the *Lancet* stating that they were "utterly at variance with the experience alike of experiment and practice as carried out in Europe," apparently unaware of the experience and practice of Edinburgh. In 1889, through the energy of Surgeon-Major Lawrie and the munificence of the Nizam, the famous second Hyderabad Chloroform Commission was formed. The *Lancet* accepted the princely offer of the Nizam of £1,000 towards the expenses of a representative on the Commission and selected Dr., now Sir, Lauder Brunton, F.R.S., in whom we all recognize one of the keenest intellects ever devoted to the study of pharmacology. Four hundred and thirty experiments were made on dogs and monkeys and the conclusions of the Commission were a complete endorsement of the Edinburgh teaching. "In every case respiration stopped before the heart, sometimes a long time before it." The final clause of the report reads thus: "The Commission has no doubt whatever that if the above rules be followed chloroform may be given in any case requiring an operation with perfect ease and absolute safety so as to do good without the risk of evil."

In publishing the report of the Commission the *Lancet* says: "It will be seen that the discrepancy between the views of the different schools arises from the fact that sufficient consideration has not been given to the conditions under which the chloroform is given. Although it may paralyse the heart if applied directly to it yet this condition does not occur in practice. . . . It is inhaled by the patient and when this is the case it stops respiration before the heart. The practical outcome of the research would appear to be that deaths from chloroform are not inevitable."

But the findings of the Commission were not accepted in London. In a short time physiologists have devised experiments which seemed to demonstrate errors in the Hyderabad methods, and accumulating statistics as well as frequent comments in the

medical press made it clear that whatever the state of affairs might be in India among dogs and monkeys, human beings died in England under chloroform from paralysis of the heart, and day by day ether supplanted chloroform.

I suppose that in the whole history of medicine no question has been argued more strenuously than this of chloroform anæsthesia. It bristles with paradox and contradiction. To one who had known by bitter experience the tragic suddenness of heart failure under chloroform, what a stupid and cruel paradox must have been the opinion that possibly enough chloroform had not been given. What could be more contradictory of the Hyderabad Chloroform Commission, or of the simple statement of Lister, "Wherever an anæsthetic is demanded chloroform is applicable," than the opinion of H. C. Wood in his "Therapeutics" that "the use of chloroform under ordinary circumstances is unjustifiable. It kills without warning so suddenly that no forethought or skill can guard against the fatal result. . . . Statistics seem to indicate a mortality of about one in three thousand inhalations and hundreds of unnecessary deaths have been produced by the extraordinary persistence in its use of a portion of the profession. It ought never to be employed except under special circumstances."

Among the conclusions of the Anæsthetics Committee of the British Medical Association occur the following statements about chloroform. There is "abundant evidence of primary cardiac failure," "Chloroform is most dangerous during early infancy;" also, that the respiratory complications after chloroform are more grave and persistent than after ether. Every one of these statements is met with a direct negative by the Edinburgh school.

To doubt an opponent's word, to misstate his case, to refuse his evidence is a summary, but not a satisfactory, way of conducting an argument, and each side claimed the field. To the man who had learned from Syme or from Lister how to give chloroform, and who had for years been giving it without difficulty, these attacks upon chloroform were curiosities of science. He knew chloroform was a dangerous drug, also that morphia, strychnia and mercury are dangerous. He readily admitted evidence of cardiac paralysis from chloroform but he believed he could avert it. He did not doubt there were many deaths under chloroform, on this point he freely accepted the statistics of his London colleague and could frankly congratulate him on not having a greater mortality, for he knew the London method was radically wrong and courted disaster. The cross-circulation experiments of Gaskell

and Shore were not to the point for it was not in that manner that chloroform was given in Edinburgh. And the ingenious experiments in which Waller demonstrated at the British Medical Association meeting in Montreal in 1897 the direct effect of chloroform vapour on living nerve tissue, were of interest to him chiefly in so far as Waller indicated that a certain percentage of chloroform vapour was safe. The statistics of the Anæsthetics Committee did not influence him, for he knew that they referred to an entirely different method of administration, and were practically not in the same category with his own. For instance, the average time for administering one ounce of chloroform as reported by the Anæsthetics Committee was over fifty-four minutes, while Lawrie's time was less than seven minutes.

A quarter of a century has passed since the conflict raged over the work of the Hyderabad Chloroform Commission and its echoes have not yet died away, for Lieut.-Col. Lawrie still wields a trenchant pen in defence of chloroform while its opponents are not ashamed to stigmatize the Edinburgh method as "antiquated, clumsy and dangerous."

In the interval a great deal of investigation has been carried on, new theories have been advanced as to the action of anæsthetics, new anæsthetic agents have been discovered, and entirely new methods have been elaborated. Many of these are on their trial. Some require expensive and cumbrous apparatus, well enough suited for hospitals but impossible for general practice. In our hospitals we look for, and generally find, all the recent and approved devices for anæsthesia and experts skilled in using them and with experience in selecting the best form of anæsthesia for each case or operation. But the majority of those who require anæsthetics have not the advantage of a hospital. Doctors in small towns and villages, to say nothing of the backwoods and the prairie and and the ship at sea, must have some convenient, portable and easily manageable anæsthetic and there are only two, ether and chloroform. Ether is at present undoubtedly the favourite because it is considered much safer. It has certain disadvantages. Its great volatility makes it unsuitable in hot climates. It is readily inflammable, a much larger quantity is required to produce anæsthesia, and what is more serious, it is admittedly dangerous in certain pulmonary, renal and cerebral conditions, so much more dangerous than chloroform that this much dreaded agent is preferred in such cases even by those who use ether habitually. Statistics indicate that death during anæsthesia is much

rarer under ether than chloroform but it has long been known that patients who have safely emerged from the influence of ether may die shortly afterwards from pulmonary complications such as cedema of the lung and pneumonia, or other conditions.

Chloroform is a much more powerful drug; the experiments of Waller showed it to be seven times more potent than ether (a very different thing from seven times more dangerous). When symptoms of danger arise during its use they are more urgent and startling than in the case of ether, and if death comes it comes with appalling suddenness, and there can be no doubt this is one of the reasons why ether has so largely superseded chloroform. Chloroform is much more pleasant, convenient and manageable than ether and, according to the Edinburgh school, is applicable in all cases. It has been found, however, in recent years that death may occur in the case of chloroform also after the patient has recovered from its immediate effects. Delayed chloroform poisoning, as it is called, may be met with in severe sepsis, as Mikulicz showed twenty years ago, and in the condition known as acidosis in which ether and nitrous oxide also may be followed by a fatal result.

It is a common statement that chloroform is six or seven times as dangerous as ether, that chloroform is fatal about once in 3,000 cases and ether once in 18,000 or 20,000. In the year 1893, Gurlt published a series of statistics from German practice which showed chloroform to be five times as dangerous as ether. The largest collection of statistics of which I have knowledge is that made by the German Surgical Society for the seven years 1891-97. There was a total of 330,000 anæsthesias with a mortality from chloroform of one in 2,075, and from ether of one in 5,112. This would indicate that chloroform is about two and a half times as dangerous as ether. Another set of statistics is that of Neuber for 1909 of 70,000 cases, with a chloroform mortality three times as great as that of ether.

If we accept these results there is nothing more to be said. If chloroform is twice as dangerous to say nothing of six or seven times, it should be abandoned. But it is quite evident that the medical profession is not convinced by these figures, for chloroform is still very largely employed. Statistics are fine material to juggle with and must be sharply criticized. Morgagni has warned us that observations must be pondered as well as numbered. We wish to know whether these deaths were all "on the table," or are post-anæsthetic deaths included. We wish to know why in

some cases chloroform, in others ether, was given. If ether is withheld from some patients and chloroform given instead, the statistics are vitiated. A surgeon who declines to operate on certain serious cases may compile a very successful record of operations at the expense of a colleague who does not refuse them. Then unless there has been a uniform method of giving chloroform the statistics as regards chloroform are not admissible. And unless that method has been the Edinburgh method, the Edinburgh school cannot recognize them, for it does not consider that chloroform has had a fair test. These German statistics are therefore inconclusive.

Now we have some statistics taken in London. In 1897, Dr. Probyn Williams found the mortality from ether in the London Hospital was one in 2,910. In 1900, Crouch and Corner kept a record of all the anæsthesias in St. Thomas Hospital in order to determine the question of ether pneumonia. There were 3,000 cases, 2,400 ether cases with 10 after-pneumonias, and one of these died. There were two other deaths from ether and this gives an ether mortality of one in 800. There was one death in the chloroform series of 600 cases. The point here is that in one of the leading London hospitals there was a mortality from anæsthetics of one in 750 cases, and an ether mortality of one in 800.

We have another set of statistics bearing on the question of pneumonia after anæsthesia. At the Frauenklinik in Erlangen, in the years 1887 to 1894, there were 338 laparotomies, with 21 cases of pneumonia. Of these 300 were chloroform cases, with 15 pneumonias, 4 of which were fatal. There were 38 ether cases and of these 6 developed pneumonia and 4 died. This gives a post-chloroform pneumonia rate of 5 per cent. and a post-ether pneumonia rate of nearly 16 per cent. It gives a chloroform-pneumonia mortality of 26 per cent. and an ether-pneumonia mortality of 66 per cent. The total mortality after chloroform was 1.3 per cent., and after ether 10.5 per cent. But all the mortalities recorded are from pneumonia. Let us suppose that the 4 deaths after ether pneumonia were the only deaths from ether, then the total ether mortality is 10.5 per cent, 105 per thousand! Now if chloroform is 6 times as dangerous as ether there should have been a chloroform mortality of 60 per cent. which means that 180 of the 300 chloroform cases should have died. If it were only twice as fatal as ether 63 should have died of the 300 cases. Even German patience would not endure this. As it is the total mortality is 23 per 1,000.

If there is any country in which we should look for good results from ether it is in America, where it is the favourite anæsthetic. It so happens that a few days ago my attention was drawn by my friend, Dr. Bruce Almon, to a report in the *American Journal of Obstetrics* for May of the present year, of a discussion on a paper on spinal anæsthesia read before the Obstetrical Society of Philadelphia. One of the speakers in favour of spinal anæsthesia says: "In my experience as resident and operator I have seen about eight deaths from ether and nitrous oxide. . . . Adding the experience of several of my associates we have collected 35 deaths from an estimated aggregation of 15,000 anæsthetizations." This is a mortality of more than one in 430. Of these deaths 27 were from ether and 4 from chloroform. This is a sad confession of incompetence and we do not wonder that the speaker is in favour of spinal anaesthesia, with which they have been so successful that of over 5,000 cases they have "only had ten deaths on the operating table," a mortality of 2 per 1,000!

This exposition of anæsthesia comes from Philadelphia, where Professor Wood declared that with a mortality of 1 in 3,000 the use of chloroform was unjustifiable.

The statistics which I have so far quoted do not by any means indicate that ether is many times safer than chloroform. But we have no information as to the manner in which the chloroform was administered. Let us now consider some statistics of the mortality from chloroform, when given in the right way.

I have said that the fatal case which made so profound an impression on us in Edinburgh in 1877 was the first for nineteen years. Considering the number of surgical cases in the Infirmary it is reasonable to suppose that there was an average of 1,500 chloroform administrations in each year and this would give about 30,000 cases without a death. Lister, writing in 1870 in Holmes' "System of Surgery," states that during the previous nine years there had been no deaths from chloroform in the Royal Infirmary of Edinburgh and Glasgow. This will give about from 25,000 to 30,000 cases without a death. Lord Lister had one fatal case in his own practice shortly before he wrote his last article on anæsthesia in the third edition of Holmes' "Surgery." By that time he had had thirty years' experience of chloroform, and it is a reasonable estimate that he must in that time have seen about 18,000 or 20,000 before this death occurred.

Lieut.-Col. Lawrie, the veteran protagonist for chloroform, states that "the late Mr. Syme's cases and my own form a con-

tinuous series amounting to more than 45,000 cases . . . extending from 1847 to 1890 in which the respiration alone was taken as a guide, without one death resulting."

It is on record that Billroth had used chloroform 12,500 times before he met with his first accident, Bardeleben of Berlin had 30,000 cases, Nussbaum of Munich 40,000 cases and Hunter McGuire, the well-known surgeon of Stonewall Jackson's army corps, had 28,000 without a death. I am aware that these statistics have been called antiquated. So is a fossil, but a fossil is a fact.

I have just received from my friend Dr. Lyall, director of the Mission Hospitals of the English Presbyterian Church in Swatow, China, the annual report for 1913, being the jubilee year of the Hospital. He states that during these fifty years there has only been one death from chloroform, which is the only anæsthetic used. This case occurred twenty years ago. He is unable to state the total number of cases, but, as during the last ten years there has been an average of 500 a year, it is probably well within the mark to say that there have been 10,000 cases with one death. And he has never seen post-chloroform poisoning.

It is evident that we have no uniform basis for a statistical inquiry. Compare the Erlangen chloroform mortality (from pneumonia alone) of 13 per 1,000 with Lieut.-Col. Lawrie's 45,000 cases without a death. Compare the estimate of Wood that chloroform is fatal in one out of every 3,000 cases, with the admission of one death in 600 at St. Thomas Hospital.

Of greater value than any laboratory experiments on dogs or rabbits, of much greater value than a confusing and conflicting array of statistics, are the matured opinions founded on long experience, of those who have used chloroform successfully. Lister agreed with Syme that any case fit for operation was fit for chloroform. Mikulicz, whose great experience and sound judgment placed him in the front rank of modern surgeons, did not accept the teaching of Gurlt's statistics. He had observed the post-operative risks of ether and deliberately chose chloroform. In the opinion of Professor Caird, of Edinburgh, chloroform is "the best general anæsthetic." In a letter I have lately received he says: "Chloroform requires greater care and attention in its administration. My only objection to its use is in young toxæmic children, but I also think that the danger of post-chloroform poisoning is a little overrated and in other than urgent cases can be prevented with suitable care. Nor is ether free from the same

danger. Again the diagnosis is not always clear and septic conditions mimic it. Its simplicity and ease of management commend chloroform most highly. Observance of the old Edinburgh rule, and strict attention, that is all. I feel strongly that ether has the vogue because its immediate risks in the hands of the man who cannot bear responsibility are less than with chloroform. Chloroform has been studied too much from the cardiac and pulse side and not sufficiently from the respiratory-centre side."

The dread of direct cardiac poisoning is what prevents many from using chloroform. But cardiac disease is no bar to the use of chloroform. The clearest statement on this point is made by Lister. "If a person with known cardiac affection decides to place himself in the hands of the surgeon, so far from being unsuited for the anæsthetic he is before all others the man who stands most in need of its protecting influence." Huchard, the eminent French clinician, does not admit that either heart disease or angina pectoris is a contra-indication to the use of chloroform, and in this opinion Berger and Brouardel agree with him. He lays great stress on the point that in heart disease the anæsthesia should be absolutely complete.

It may not be generally known that while he was in general practice, Dr. James Mackenzie, the eminent authority on the heart, was surgeon to the hospital at Burnley and had a large surgical experience. If I am not mistaken he was led to take up this surgical work because he found so widespread a dread of anæsthesia that it was difficult to induce patients to submit to operation. He had full confidence in chloroform and used it, and is to this day an advocate of this "dangerous drug."

There are few cases which cause greater anxiety as to the effect of an anæsthetic than inflammatory cerebral conditions, and there is no greater master of brain surgery than Sir William Macewen, who says of such cases: "The anæsthetic ought to be chloroform—never ether." There is no authority on anæsthesia who is heard with greater respect and confidence than Dr. Dudley Buxton of London. He advocates the dosimetric system and the Vernon Harcourt inhaler, and he assures us that "by their use the dangers of chloroform are abolished or so far lessened as to be negligible." Levy's work shows that probably the only cause, of any moment, of death under chloroform is ventricular fibrillation and that it can be prevented by steadily maintaining a full degree of anæsthesia.

I have been giving chloroform and watching its administra-

tion for forty years and I have not yet seen a death from chloroform. I do not think chloroform or any other anæsthetic is absolutely safe, and I approach every case with the feeling that this may be one of idiosyncrasy, and the recollection that chloroform, potent for good, is also potent for evil.

In emergencies of my practice I have often had to entrust its administration to unqualified persons, I have had anxious moments, many of them false alarms, most of them due to insufficient chloroform, and in the few cases in which real danger seemed to threaten it was through artificial respiration that the patient was restored to safety. I have always used Duncan and Flockhart's chloroform, and as a rule that prepared from methylated spirit. We often used it in Lister's wards and I see that Sir Fred-eric Hewitt, one of the leading London anæsthetists, recommends it.

I believe that chloroform when properly given is the most convenient, most easily manageable, most universally applicable and safest of anæsthetics.

*Discussion**

Dr. Primrose stated that he had given his first anæsthetic, before he studied medicine, for Dr. Stewart. He also said that in the Old Country the surgeon shared the responsibility. This has a great advantage when we have to deal with unskilled anæsthetists. Instruments of precision tend to make the administration more dangerous. Such methods are complicated and the apparatus not suitable for being carried about. He asked about the use of anæsthetics in diabetes.

Professor Fraser Harris: Perhaps some light can be thrown on cases of early death under chloroform, i.e., in very light chloroform anæsthesia, if one considers the behaviour of rabbits and cats under chloroform. Whereas it is easy to keep up prolonged chloroform anæsthesia in the cat and difficult to induce in it cardiac fibrillation (*delirium cordis*), it is not at all easy in the rabbit to maintain chloroform anæsthesia, and sudden death from cardiac fibrillation is common. In other words, small quantities of chloroform are more poisonous to the rabbit heart than to the cat heart. In an extended (but unpublished) research years ago in Glasgow University we failed to find fatal ventricular fibrillation at all common in cats, whereas it is so in rabbits. Levy, of

* See also the discussion on Dr. Nagle's paper, p. 1051.

London, believed that even in cats it is a fairly frequent fatal occurrence.

Now it is probable that the difference in response of rabbit heart-protoplasm and cat heart-protoplasm is due to some unknown chemical difference towards chloroform in the two types of heart respectively. Is it not possible that sudden death in the human may be due to this same intolerance of slight amounts of chloroform which may be called, when met so comparatively seldom, an idiosyncrasy towards chloroform? It may also be possible that a psychic factor coöperates with this chemical susceptibility to induce the cardiac fibrillation which is fatal in certain cases of light chloroform anæsthesia in man.

Apparently with chloroform, as with so many other drugs, the effects on cardiac protoplasm are different according as the dose is small or large: a large dose kills by toxic immobilisation, by fatal motor paralysis—the drug having too firmly combined with the myoplasm, whereas in some cases which cannot be detected beforehand, a small dose irritates without immobilising, but induces a state of muscular fibre incoördination which incapacitates the heart from effectively emptying itself, thus letting the cerebral blood reserve fall to a fatal level.

Dr. Hunter claimed that the important point was mainly that the careful attention of the anæsthetist is necessary. The fee ought to be more than \$5.00.

Dr. Stewart, in reply, stated that the most of his work was in private houses, and that he would recommend the anæsthetic the anæsthetist is most familiar with. Chloroform should not be given too slowly. Lawrie's time was seven minutes to one ounce.

A SMALLPOX hospital is to be erected at St. Thomas. The matter has been under consideration for the past two years and the frame building which has served as an isolation hospital is quite unfit for habitation. A Roman Catholic hospital is also to be erected at St. Thomas. The cost of the proposed building is estimated at from \$60,000 to \$100,000. The plans are being prepared for a smallpox hospital at Brantford.

X-RAY EVIDENCES OF GASTRIC CARCINOMA

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ALTHOUGH carcinoma of the stomach was one of the first targets of *x-ray* effort in the field of internal medical diagnosis, yet still one occasionally hears, even from lips which should be authoritative, expressions of doubt as to the reliability of the Roentgen method, especially with reference to the exclusion of malignant disease. For more than ten years the bismuth method has been employed as an aid in the study of gastro-intestinal disorders, and the literature of roentgenology is richly supplied with contributions relating to carcinoma of the stomach. Yet in view of a certain amount of distrust, and even lack of knowledge, concerning the value of this diagnostic means, the writer ventures to submit a summary of the indications and special advantages attending its use. In the space devoted to the Scientific Exhibit will be found a series of radiograms illustrating the value of the bismuth study of the colon with special reference to the diagnosis of bowel cancer, and its differentiation from various other conditions which are radiologically similar. This paper will be restricted to a consideration of the Roentgen evidences of carcinoma of the stomach.

When a suspension of some salt opaque to the Roentgen ray is introduced into the empty stomach, the lumen of the stomach, if normal, presents a characteristic complete shadow, subject to certain normal indentations. These normal indentations are as follows:

(a) The splenic notch, usually present at the upper border of the greater curvature, and due to the pressure of the spleen against

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the greater curvature. One may judge thereby as to the size of the spleen.

(b) The changes in shape of the stomach shadow produced by the peristaltic waves are varying but characteristic, and are easily recognized under the fluorescent screen or by a series of radiograms.

(c) The pyloric sulcus, the break between the shadow of the stomach and the shadow of the first portion of the duodenum (variously termed *bulbus duodeni*, duodenal bulb, stomach cap, *pilleus ventriculi*), is normally about one centimeter in width.

Excluding these normal indentations in the shadow of the stomach, any defect in the shadow must be regarded as suspicious of malignancy, and its identity determined. In favourable subjects where the fluoroscopic image is clear, the screen study of the contour of the gastric silhouette is very satisfactory, although the writer for the sake of absolute safety from criticism usually makes several radiograms as a matter of record, even in the cases satisfactorily studied by the screen method. In heavy patients, ten or twelve radiograms usually suffice. On a number of occasions unsuspected gall and kidney stones have been discovered in this manner, and in patients too heavy for favourable fluoroscopy the serial radiograms have made possible the discovery of relatively early carcinoma. The reason for the use of the term "relatively early" will appear later in this paper in the discussion of the possibility of negating a diagnosis of carcinoma.

In the effort to render possible an earlier diagnosis of gastric cancer than he had till then been able to make by the recognition of filling defects in the stomach shadow, Holzkecht grouped a number of radiologic and clinical signs under various heads each one a "symptom-complex." The following symptom-complex relates to gastric carcinoma: "(1) Bismuth residue six hours after the Rieder meal. (2) Normal shadow of the stomach seen on the screen. (3) Achylia. Diagnosis: A small carcinoma of the pylorus. In the symptom-complex noted above, the reasoning is as follows: Achylia is always associated with hypermotility as long as the pylorus is free, the stomach emptying in two or three hours. Therefore, a residue after six hours must mean an organic obstruction, because spasm of the pylorus is never associated with achylia, but with hyperacidity."

The writer refers to the above symptom-complex of Holzkecht, only to warn against its unreliability, for while it is true that in a certain number of cases such reasoning might lead to the recognition of an early pyloric neoplasm, the same reasoning in many other

cases will lead to ignominious failure. The writer has seen cases fitting perfectly into the above symptom-complex which at operation proved to be not malignant, but due to adhesion bands, pressure of extra-ventricular masses or gall-stones; and sometimes no pathology at all could be demonstrated at operation. The writer is thankful that he was able to test out this matter in a manner which did not reflect unfavourably upon himself or the surgical staff through whose courtesy the rigid check-up was possible. Thanks to a routine which requires that all patients about to be subjected to laparotomy in the surgical department of the Battle Creek Sanitarium be first submitted to a thorough bismuth meal examination of the entire gastro-intestinal tract, the writer has been able to check at operation the x-ray findings in hundreds of cases. For instance, in a patient operated upon for uterine fibroids, the surgeon as a routine procedure at operation examines and records the condition of the gall-bladder, the pylorus, the duodenum, the appendix, the terminal ileum, etc., so that, without working inconvenience to anyone, the preoperative x-ray findings, negative or positive, even though not directly relating to the object of the operation, are corrected, and future errors minimized. From his experience, thus secured, the writer seldom relies upon the symptom-complex method of recognizing gastric carcinoma.

As a matter of fact, the symptom-complex method is unnecessary, since serial radiography and, when necessary, cinematography afford us a means of studying intimately the contractility of the entire gastric wall, and of excluding even very small indurating lesions. The writer would not presume to state that carcinoma of the stomach could not exist in a lesion too small for detection by carefully conducted radiographic search, but he will place on record the statement that up to the present moment, since the time he was fitted by equipment and experience to make these thorough studies, not a single case of carcinoma of the stomach to his knowledge has been revealed at operation where previous x-ray examination had failed to show an organic lesion. There are cases, particularly the early cases, where, from the x-ray examination alone, one may only say that there is a mass, without venturing an opinion as to whether it is due to ulceration with inflammatory reaction or to malignancy. One must also think of syphilitic and sarcomatous lesions, and the possibility of having to deal with a tuberculous mass. The writer has in one instance successfully diagnosed a tuberculous ulcer of the stomach.

A careful study of the gastric silhouette by means of the

fluoroscope and a series of radiograms, should then permit a positive or negative opinion as to the presence of a filling defect. This filling defect may be characteristically irregular, indented as by finger-prints, or otherwise definitely suggestive of carcinoma without the corroboration of other clinical findings, but as a routine all the evidences of clinical research, including the Abderhalden test, will be added to the x-ray findings if one would make an ideal study of the case.

The gross filling defect produced by a tumour of the lower half of the stomach on the greater or lesser curvature is usually obvious. The characteristics are as follows:

1. Permanence. The filling defect is of the same size, in the same location, and of the same identical shape and outline at the various observations.

2. The filling defect usually coincides with a point of tenderness on pressure, or, if the entire epigastrium be tender, with the point of most marked localized pressure-pain. The absence of a pain-point does not at all negative the seriousness of a filling defect.

3. Screen examination as well as serial plate examination will show that the peristaltic waves fade out as they reach the region of the filling defect; and, provided it is not too near the pylorus, the waves reappear beyond the defect, proceeding to the pylorus. An inflammatory mass associated with ulcer may give rise to this same phenomenon.

4. When the lesion is near the pylorus, even though not directly producing stenosis, antiperistaltic waves may be observed. These are seldom recognized on plate examination, but if repeated fluoroscopic observations are made, at some time or other in every case of organic pyloric obstruction antiperistaltic waves are likely to be observed; when seen, they are pathognomonic of an organic lesion. Here again the evidence does not necessarily speak for malignancy, but with a filling defect, antiperistalsis is exceedingly suggestive of malignancy.

5. Unless there exists actual mechanical obstruction due to narrowing of the lumen of the stomach, there is usually early clearance of the stomach contents in a manner characteristic of achylia. This is a point in the differential diagnosis between benign and malignant hour-glass stomach. In ulcer cases the emptying time of the stomach is usually normal or even prolonged. Even in pyloric carcinoma, there may be a pyloric insufficiency, the action of the sphincter being hindered by the induration of the gastric walls before the extension of the tumour growth has produced

actual stenosis. In such cases, even though a moderate grade of gastric acidity still exists, clearance of the stomach contents may take place with unusual rapidity. As soon as pyloric stenosis is produced, however, the symptoms are those of gastrectasis. The peristaltic waves are increased in depth, at times almost cutting the gastric shadow in two; the waves are increased in frequency, and begin higher up in the stomach; and if one be fortunate, antiperistaltic waves may be recognized, especially after digital manipulation of the stomach through the abdominal wall, or after the patient has taken several gasping deep breaths. Antiperistaltic waves are best seen an hour or two after the ingestion of the meal.

The determination of the extent of a gastric tumour and the probability of adhesions to neighbouring organs, as well as the identification of pain-point on pressure, can only be accomplished satisfactorily by palpation under the fluorescent screen. A wooden spoon of special design is very helpful in this manipulation, though in the writer's opinion it is practically safe to use the hand for this purpose provided it is protected with a heavily leaded glove. If there are evidences of fixation to neighbouring organs, the probable extent of the tumour may be inferred.

Ordinarily when the tumour does not produce pyloric stenosis, the test meal will pass quickly through the stomach and quickly through the small intestines into the colon. If the bismuth, having reached the small intestine, is gathered here and there in large ropy masses, arriving at the cæcum later than would be expected in such a case, one may, in the presence of definite evidences of gastric carcinoma, properly suspect a peritoneal carcinomatosis. The writer has seen this in several cases of infiltrating scirrhus carcinoma of the stomach, one of which is shown in the accompanying illustration. A study of the contour of the upper surface of the liver—the phreno-hepatic shadow—may in advanced cases of carcinoma give information as to whether or not metastasis has occurred into the liver. The contour of the right diaphragm is easily studied by the screen method, the patient and the tube being variously adjusted in order to show up the entire upper surface of the liver.

Symptoms of esophageal obstruction are frequently found in cases of gastric carcinoma. These symptoms may be due to the backing up of food into the esophagus from a stomach whose lumen is much reduced through carcinomatous involvement or through enlargement of the liver owing to metastasis. This is not an uncommon observation. The food column in the esophagus may,

during ingestion, rise higher than the base of the heart, but usually the pabulum passes into the stomach after a few moments. In cases of actual invasion of the cardia, the usual signs of esophageal obstruction are present.

In this connexion it is proper to urge the importance of making a complete gastro-intestinal Roentgen examination in every case of suspected carcinoma of the stomach, in order to rule out, if possible, extension to or metastatic involvement of other organs. The finding of metastases, especially those occurring in the pouch of Douglas, may permit a differentiation between a filling defect due to ulcer and one due to carcinoma. It should be more generally recognized by radiologists that examination of the lower bowel may reveal evidences of the co-called "Douglas metastases," though on account of the easy accessibility of the rectum for digital exploration, physical examination is also very useful.

In differentiating between benign cicatricial stenosis of the pylorus and stenosis due to malignancy, the writer has found it of especial value to make the screen and plate examination with the patient lying on the right side, the tube behind the patient, and the screen or plate held vertically against the abdomen. In this manner it is possible to bring out the finest detail of the pyloro-duodenal region, often to better advantage than with the patient in the prone position, plate anterior. Unless the pyloric carcinoma has supervened upon an old stenosing ulcer, it is likely that the stomach will not be greatly dilated in pyloric cancer, for the reason that the malignant process has advanced too rapidly to permit extensive dilatation. In benign ulcerous stenosis, on the other hand, including those cases where the ulcer has later degenerated into malignancy, the long duration of the process permits enormous increase in the size of the stomach.

Extra-ventricular tumours, unless intimately adherent to the stomach, may be differentiated through the fact that the normal gastric peristalsis is not interfered with. This is best determined by fluoroscopy, although the expenditure of a number of plates may afford the same information.

In differentiating between hour-glass due to ulcer and that due to carcinoma, there are several important points to be observed. Ulcer and carcinoma show differences in position, length and outline of the connecting canal between the upper and lower sac, as well as in the relative size of the two sacs. The ulcer or its scar is almost always located on the lesser curvature. The writer has seen but one case of ulcer high up on the greater curvature, in that

instance penetrating into the spleen. The contraction associated with lesser curvature ulcer always occurs toward the lesser curvature, the seat of the shriveling agent. The connecting canal between the upper and the lower sac is located near the lesser curvature, and its outlines are usually nearly smooth and regular. There is often a slight projection of the stomach shadow at the site of the ulcer, owing to excavation attending the ulcer process. In ulcer only a limited portion of the lesser curvature is pulled over toward the ulcer; the narrowness seldom affects the greater curvature for more than half an inch. In carcinoma, on the other hand, although the tumour usually starts on the lesser curvature, it produces there a light space (filling defect), and the connecting channel between the upper and the lower sacs is located near the greater curvature. When the malignant hour-glass is produced by an annular carcinoma, the lumen between the two sacs occupies a median position, lying in the axis of the stomach. The length of the carcinomatous narrowing is greater than with ulcer, unless the ulcer has been attended by perigastric adhesions of considerable extent, or unless the ulceration has been multiple. The contour of the filling defect is irregular and often indistinct, because the wall of the stomach is infiltrated. In ulcer the pathological findings occur opposite the site of the filling defect, while in carcinoma there is resistance, often pain, and sometimes a palpable tumour corresponding with the filling defect.

Differentiation between the hour-glass of ulcer and of carcinoma is helped by a consideration of the relative size of the two sacs. This relative size depends upon the relative position of the hour-glass constriction to the pylorus, upon the degree of constriction, and upon the condition of the pylorus. The greater the constriction and the nearer the constriction to the pylorus, the greater will be the size of the upper sac. The size of the lower sac, which is of greatest differential diagnostic importance, depends upon the permeability of the pylorus. A large lower sac exhibiting vigorous peristaltic waves speaks for ulcer, owing to the tendency of the pylorus to abnormal spastic contraction in the presence of ulcer; whereas in carcinoma the absence of free hydrochloric acid with resulting relaxation of the pylorus does not favour development of a large lower sac. Hence, we may conclude that in hour-glass stomach, when the two sacs are markedly different in size, and especially when the lower sac is small, this fact speaks for carcinoma.

Holzkecht was one of the first to call attention to the possibility of utilizing the x-ray examination to draw conclusions as to the resectability of carcinoma of the stomach. Holzkecht is

careful to use the word resectability rather than operability, because metastases to glands can hardly ever be suspected, and adhesions are recognized only with a relative degree of certainty. According to Holzkecht and Haudek, in resectable cases the normal hook form of the stomach is usually preserved, while the types of tumour cases which are not resectable show the diagonal short small form of the stomach. Even very large tumours requiring a subtotal resection are usually still resectable if they preserve the hook form. Another symptom of resectability is the preservation of the distensibility of a considerable portion of the stomach. One should not neglect study of the phreno-hepatic shadow and of the remainder of the gastro-intestinal tract, especially the pouch of Douglas, before reaching conclusions as to operability.

In a certain class of cases where the clinical examination warrants a reasonable suspicion of malignancy, and where the *x*-ray findings are negative, it is wise to repeat the *x*-ray examination after four or five weeks. In a few cases the second examination has revealed evidences of malignancy not made out earlier; in the majority of cases the negative diagnosis will be strengthened. One of the most useful purposes of the *x*-ray examination in this class of cases, as well as in cases of inoperable malignancy, is to save the patient from an unnecessary exploratory operation.

In spite of the assurance which the writer feels is often warranted in making a positive statement as to the absence of malignant disease of the stomach, it is a striking observation that radiologists rarely diagnose an *early* carcinoma of the stomach. It is probably very rare indeed that a case of truly early carcinoma is seen at operation. That the application of the diagnostic points described in the foregoing pages is adequate is attested by the fact that not once in the hundreds of operated patients already mentioned was carcinoma found by the surgeon when the pre-operative *x*-ray examination had failed to find an organic lesion; yet not more than a dozen of the gastric malignancies could really be considered as early. With malignant disease of the stomach, the morbid sensations produced by the affection are of such indefinite nature* that the patient seeks medical advice only when it is too late for an early diagnosis. And, as Huerter says, even if during the first examination the suspicion of a malignant tumour is forced upon the average examiner, he is seldom willing to express a positive opinion until the programme of watchful waiting has been pursued too long for an early diagnosis. Why not make the *x*-ray test a routine procedure in the examination of every case presenting gastro-intestinal symptoms?

THE COMPLEMENT FIXATION TEST IN
GONORRHOEA

BY J. J. OWER, B.A., M.D.

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THE phenomenon of complement fixation, now generally known as the "Bordet-Gengou" reaction, has been extensively applied as a means of assistance in the clinical diagnosis of various infectious diseases. This reaction depends on the following factors: (1) *Complement*, a substance present in all blood sera and destroyed by heat at 56°C.; (2) *Amboceptor*, a substance present in the blood serum of an animal which has been immunized against (3) some foreign protein, in this case red blood cells of an animal of a different species. If two sera containing certain definite proportions of these two substances are placed together in the presence of the red blood cells of an animal of one species which have been used to immunize another animal of a different species in the preparation of the amboceptor, the result will be a destruction of these red cells—hæmolysis. It is upon this hæmolysis that the complement fixation test depends.

It is known, however, that under certain conditions the presence of two other substances will inhibit this hæmolysis. These are (4) "antigen" and (5) antibody. Antibodies comprise certain substances formed in the blood serum of individuals suffering from a given disease, and are produced as the result of the specific infecting agent. The antigens for these antibodies are, strictly speaking, all substances (of proteid nature) which when introduced into an animal excite the production of antibodies. By confusion of ideas the name to-day is also applied to substances which have some of the chemical characteristics of the organism or agent causing any particular disease. Thus we speak of heart or liver extract as a syphilitic antigen: it having been found that these can replace the syphilitic virus in the Wassermann reaction.

If antigen and blood serum containing its specific antibody are added to complement, and these added to amboceptor and red blood cells, then the antibody and antigen combine with comple-

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ment in such a way as to destroy its power to unite with amboceptor to cause hæmolysis. This union of the antigen and antibody with complement with the resulting inhibition of its power to destroy red blood cells is called *fixation* or *deviation of complement*, and when present in a test in which a suspected serum is used instead of a known antibody, constitutes a positive reaction.

This is a somewhat brief explanation of the conditions required for this phenomenon. Each step requires scrupulously careful preparation. It has been found by experiment that fresh guinea-pig serum best fulfills the requirements of a complement. Blood serum of a rabbit which has been immunized against sheep red blood cells by repeated intravenous injections of small quantities of fresh sheep red blood cells constitutes or, more accurately, contains one of the best amboceptors. Sheep red blood cells must of course be used in the complement fixation test with a sheep blood amboceptor because the action of the latter is specific. Antigen varies with the disease in question, but is usually an extract of the organism which causes the disease. The antibody is of course the unknown, and a positive complement fixation test proves its presence in the serum of the suspected individual and therefore the presence of the suspected disease in the individual.

The best known and most extensive application of complement fixation is the Wassermann test in syphilis. It has also been applied to various other infectious diseases with varying results. Muller and Oppenheim were the first to record the presence of the complement fixation phenomenon in gonorrhœa. They found fixation of complement in a case of clinically definite gonorrhœal arthritis, using a treated culture of gonococcus as an antigen. They controlled their experiment with the serum of a known negative case.

It was found, however, that only certain strains of gonococci used as antigens seemed to have the power to fix complement in known cases of gonorrhœal infection. This led to the work of Geague and Gorrey,¹ Wollstein,² and Watabiki³ whose combined work proved that strains of gonococci varied in their antigenic power to bind complement. In other words, an antigen prepared from a strain of gonococcus binds complement strongly when tested with the serum of an animal which has been immunized against the same strain, but only weakly or not at all with the sera of animals immunized against others trains of gonococcus. Schwartz and McNeill,⁴ working along this line, developed a technique using an antigen prepared from several strains of gonococcus; from the use of these polyvalent antigens they report much better results.

During the past few months the gonococcus complement

fixation test, using a monovalent antigen and also a polyvalent antigen similar to that recommended by Schwartz and McNeill, has been performed as a routine in connexion with the serological department of the pathological laboratory of the Montreal General Hospital. The technique is given here in detail inasmuch as careful preparation of the reagents is essential for the best results.

Complement. A guinea-pig is bled twelve hours before the tests by cutting the carotid arteries. The blood is allowed to clot, put on ice, and immediately before use the serum is withdrawn. It is cleared by centrifugation if any red cells are present.

Amboceptor. Four or five injections of from 2 to 5 cc. of a 50 per cent. solution of fresh sheep red blood cells in normal saline ('85 per cent.) are made into the ear vein of a rabbit at intervals of five days. Ten days after the last injection the serum is titrated to determine its value as an amboceptor. If suitable, the rabbit is bled, the blood is allowed to clot, the serum withdrawn, then inactivated by heating at 56°C. for thirty minutes to destroy its natural complement, placed in ampoules and stored on ice.

Red Blood Cells. Fresh sheep blood cells are washed with saline and centrifugated several times until the supernatant fluid is absolutely clear.

Serum to be Tested. Five cc. of blood is drawn from the vein of the patient, allowed to clot, and the serum withdrawn. The serum is cleared by centrifugation and inactivated by heating at 56°C. for thirty minutes in order to destroy the complement present.

Antigen. Cultures of gonococci are grown on hydrocele fluid dextrose agar for twenty-four hours and washed off with sterile distilled water. The suspension is centrifugated, mixed with sterile distilled water, and the supernatant fluid removed. This is repeated three or four times, to remove extraneous material derived from the media; 50 cc. of sterile distilled water is then added to each 0.5 gm. of sediment and the suspension enclosed in sealed tubes and placed in water at 56°C. for half an hour. It is kept in a warm place (incubator) for ten days, being shaken for about ten minutes daily in a vaccine shaker. It is then centrifugated and the supernatant fluid withdrawn to be used as antigen. A drop of carbolic acid or lysol is added to prevent contamination. To make a polyvalent antigen several monovalent antigens are mixed.

Titration of the reagents are necessary to establish their value. Complement has been found to vary frequently and is therefore titrated before every series of tests. Amboceptor and antigen as a rule, when kept on ice, do not tend to lose their properties, but as a precaution should be titrated frequently.

In the system we have employed the tests and titrations are made on a basis of a total quantity of 2.5 cc. in each tube. In both the quantity of red cells used is 0.5 cc. of a 2.5 per cent. emulsion of fresh red cells in normal saline. In the tests alone the amount of amboceptor and of complement required in each tube is made up to 0.5 cc. with saline in each case for convenience in handling the pipettes.

Titration of Complement. Ten per cent. complement in saline is used in this titration. The complement value of guinea-pig serum has been found to vary considerably especially in young pigs. In the system here employed, the unit has been found to vary between 0.3 cc. and 0.15 cc. of a 10 per cent. solution; therefore these limits must be exceeded in the titration. In the titration of complement which is made every day before the tests proper the unit of amboceptor used on the previous day is taken as the standard. The following is a table of the titration:

Tubes.....	I.	II.	III.	IV.	V.	VI.	VII.
Amboceptor.....	1 unit in each tube.						
Complement, 10%....	0.5 cc.	0.4 cc.	0.3 cc.	0.25 cc.	0.2 cc.	0.15 cc.	0.1 cc.
Red Blood Cells.....	0.5 cc. in each tube.						
Saline.....	Add sufficient to make the total quantity 2.5 cc. in each tube.						

Incubate in a water bath at 37°C. for thirty minutes. The least amount of complement causing complete hæmolysis is to be taken as the unit of complement.

Titration of Amboceptor. With this system it has been found that using a 1 to 150 or 1 to 200 dilution of amboceptor in saline with one unit of complement the least amount causing complete hæmolysis is usually in the neighbourhood of 0.1 cc.; although not necessarily so, as it depends entirely on the strength of the amboceptor. The actual titration in the case of an amboceptor known to be approximately this strength would be as follows:

Tubes.....	I.	II.	III.	IV.	V.	VI.	VII.
Amboceptor, 1 to 150.	0.3 cc.	0.25 cc.	0.2 cc.	0.15 cc.	0.1 cc.	0.075 cc.	0.05 cc.
Complement, 10%....	1 unit in each tube.						
Red Blood Cells							
(Sheep) 2.5%	0.5 cc. in each tube.						
Saline.....	Add sufficient to make the total quantity 2.5 cc. in each tube.						

Incubate in a water bath at 37.5°C. for thirty minutes. The unit of amboceptor to be used in the test is represented by the tube containing the least amount which causes complete hæmolysis.

Titration of Antigen. This is necessary to determine the antigenic value of the extract and also to detect the presence of anti-complementary properties. In a suitable antigen there should be a wide margin between these two. Anticomplementary properties should not be present in less than twice the amount of antigen used

in the tests; otherwise there would be the danger of false positive reactions. A 20 per cent. solution of antigen in normal saline is usually used in preliminary determination of its antigenic properties, although this may be found to be too concentrated, in which case a weaker solution is used. The following table gives the usual routine titration:

Tubes.....	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
Antigen, 20%.	0.05 cc.	0.1 cc.	0.2 cc.	0.4 cc.	0.6 cc.	0.8 cc.	1 cc.	1.2 cc.	1.4 cc.
Complement,	10%..... 2 units in each tube.								
Known Positive Serum..	0.2 cc. in each tube.								
Saline.....	Add to 2 cc. in each tube.								

Incubate in water bath at 37.5°C. for thirty minutes, then add—

Amboceptor... 2 units in each tube.

Red Blood

Cells 2.5% 0.5 cc. in each tube.

The presence of antigenic qualities is determined by the presence of inhibition of hæmolysis, and in a good antigen this should be present in the second or third tube.

To determine the anticomplementary properties the above test is repeated, omitting the known positive serum. This is an important titration, and in a suitable antigen hæmolysis should be complete in the tube representing double the unit of antigen chosen for the test.

The routine usually followed each day when tests are made is:

1. Titration of complement.

2. Titration of antigen.

3. Tests proper. Here three tubes are used—one as a control without antigen and the other two with different quantities of antigen. The unit of antigen used is usually one half the greatest amount showing complete hæmolysis in the anticomplementary titration. A known positive and a known negative serum are included in each series of tests as additional controls.

The following is a table of the test:

Tubes.....	I.	II.	III.
Suspected Serum.....	0.2 cc. in each tube.		
Complement.....	2 units made up to 0.5 cc. in each tube.		
Antigen.....	None	$\frac{2}{3}$ unit	1 unit
Saline.....	Add to make total quantity 1.5 cc. in each tube.		

Incubate in water bath at 37.5°C. for thirty minutes and then add—

Amboceptor..... 2 units made up to 0.5 cc. in each tube.

Red Blood Cells 2.5 %..... 0.5 cc. in each tube.

Return to water bath at 37.5°C. for thirty minutes.

Instead of the last step in the above table the red cells may be sensitized synchronously with the first part of the test by adding equal quantities of amboceptor (two units made up to 0.5 cc. with saline) and red cells. The mixture is incubated in the water bath at 37.5°C. for half an hour. One cc. is then added to each tube and the tubes returned to the water bath. The sensitizing of the red cells has the effect of hastening the reaction.

The method of reading the results is of importance. This is done when hæmolysis is complete in the controls. A strong positive reaction consists in complete inhibition of hæmolysis. For diagnostic purposes it is doubtful if it is wise to return a report of a positive reaction if there is less than 50 per cent. inhibition of hæmolysis, which one would term a weak positive reaction.

Results

Tests were made on three hundred and seventy-five human sera in two hundred and eighteen of which the presence of a gonorrhœal infection was known or suspected. Six strains of gonococcus were used in the polyvalent antigen.

The results may be classified as follows:

1. Acute urethritis, with symptoms present for ten days or less, and with gonococci in smears: 21 cases, all negative.
2. Acute urethritis of three to six weeks duration: 17 cases; 9 weakly positive, 8 negative.
3. Chronic urethritis of over six weeks duration: 22 cases; 13 positive, 9 negative.
4. Epididymitis: (a) 19 cases with definite history of urethritis; 15 positive, 4 negative. (b) 4 cases with no history of urethritis, all negative. Two were operated on later and found to be tuberculosis. One gave a positive Wassermann reaction.
5. Prostatovesiculitis: 40 cases the majority of which were chronic and resisting treatment; 22 positive, 18 negative.
6. Arthritis: (a) Acute, with no history of urethritis and clinically of type of acute rheumatic fever; 10 cases, all negative. (b) Acute with history of recent urethritis; 8 cases, all positive. (c) Chronic:
Eight cases (female), clinically gonorrhœal arthritis; 6 positive, 2 negative.
Eleven cases, with no definite history or indication of gonorrhœa; 3 positive, 8 negative.

7. Colliculitis: diagnosed by urethroscopic examination; 7 cases, all negative.

8. Stricture: 3 cases, all negative. These cases had not had symptoms of gonorrhœa for over ten years previously.

9. Conjunctivitis: 1 case of acute conjunctivitis of the right eye showing gonococci in smears, gave a positive reaction.

10. Salpingitis: 23 cases, showing symptoms of acute or chronic inflammation of the Fallopian tubes; 14 positive, 9 negative. Of these negative cases 4 at operation were found to be tuberculous; 1 showed both tubercle bacilli and gonococci in smear, and a culture of the latter was obtained.

In addition to the above, sera were examined from eight cases in which gonococcus vaccine had been administered. These all gave positive reactions.

In one hundred and thirty sera the tests were performed using both a monovalent and a hexavalent antigen. The latter was found to give on the whole distinctly better results. With it four cases were positive which were negative with the monovalent antigen. In those sera in which both antigens gave positive reactions the hexavalent gave almost without exception the stronger reaction.

In summing up the results of our experience it may be said that the claims of recent investigators on behalf of the test seem to be justified. The test is specific and *a positive reaction with a proper technique indicates the presence of a gonorrhœal lesion.* On the other hand, negative results are not so valuable, as many sera from cases which are undoubtedly gonorrhœal give negative complement fixation tests, as, for example, in acute urethritis, where the reaction is practically always negative.

An analysis of the cases seems to show that the best results are obtained in cases where the lesions occupy sites where there is possibly a lack of free drainage. This is borne out by the high percentage of positive results in arthritis, salpingitis and prostatovesiculitis. These are the very cases in which diagnosis is often extremely difficult and it is just in these cases that the test is of most value in indicating the line of treatment to be followed. As a positive reaction undoubtedly means the presence of an active focus of gonococci, its presence in a clinically cured case of gonorrhœa would necessitate further careful examination of the case.

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INJURIES OF THE FOOT: WITH A NEW METHOD OF REDUCING DISLOCATION OF THE BIG TOE

BY M. CHISHOLM, M.D.

Halifax

WHAT the pneumatic tyre is to the automobile, the foot is to the human body. It has other functions, which aid locomotion and steady the gait, making walking easy and graceful. All the structures of the foot are directly concerned in these functions, and those of the leg and thigh either directly or indirectly. It would take a treatise, and not a short paper, to go into these things minutely.

The chief design of the foot is support of the body weight. This falls upon an arch whose extremities are the os calcis posteriorly and the ball of the great toe anteriorly, chiefly. Closely allied to the supporting function is that of steadying or balancing. When the weight of the body is thrown upon one foot, a steadying action is necessary, and this is provided for by the little toe and its neighbours. These constitute the outer border of a lateral arch, which stands much in the same relation to balancing as the antero-posterior arch does to supporting.

The efficiency of these arches will depend upon the soundness and stability of the structures composing them, and the healthy action of those connected with them. The effect of injury to any of these structures will therefore vary all the way from a slight limp to complete disability. These injuries may be classified under four heads: ignorance, fashion, occupation, and accident. Three of these, ignorance, fashion, and occupation are so closely related that a separate consideration of them in a short paper is unnecessary.

When a man gets out of his bath in the morning, it is instructive to study the shape of the track formed by his wet feet upon the floor. Roughly, it is in the form of an arc made by the heel, the outer edge of the os calcis, the cuboid, the fifth metatarsal and

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the prominence under the heads of the other toes. Contrast this with the track of the heeled boot, and you will readily perceive why so many of us are troubled after our day's work with tired aching legs, or in a severe degree with flat crippled feet. The weight of the body falls partly upon the heels which are placed below the posterior end of the os calcis, behind the centre of gravity, as transmitted through the middle line of the malleoli; and also upon the balls of the toes. This tilts the foot into a position of equinus and leaves the anterior end of the os calcis, with its adjoining cuboid, without its natural support. The strain falls upon the ligaments and upon the leg muscles, whose tonus helps to support the arch. The ligaments stretch, the leg muscles tire out and ache, and the arch falls, bringing the scaphoid down to the level of the cuboid or lower, with more or less eversion of the foot.

The lesson from all this is, that if we are to be the victims of ignorance on the part of manufacturers, or of fashion on the part of aping nincompoops, or of occupation on the part of the unknowing, then if we must have heels, let them come well forward, particularly on the outer side, so that our shod tracks shall closely approach those of our bare feet after our bath in the morning.

HALUX VALGUS. The modern shoe is responsible for much more than flat feet. Among these is cramping and deflection of the toes. In this process the big toe, from its prominence, is the greatest sufferer. It is driven outward to rest upon or below its fellows. Nature rebels against the pressure and forms a bursa to protect its more exposed surface. Then this bursa may become infected, and we get a suppurating bunion which may or may not communicate with the joint. In the treatment of these deflections it should never be forgotten that the ball of the great toe is the main anterior supporting pillar of the arch of the foot, and that this pillar of support should be conserved by saving the head of the metatarsal. It may be pared but not excised—pared obliquely inwards, leaving the outer part of the head still covered with cartilage. Many authorities wrongly recommend excision, but Cheyne and Burgard are soundly anatomical in advising against it.

DISLOCATION OF THE GREAT TOE. Did you ever get baffled and exasperated by such a small thing as a dislocated thumb or toe? Last winter a patient came into the hospital whose foot was jammed antero-posteriorly, throwing the big toe upwards and backwards over the head of its metatarsal. I saw the patient next day. The toe was much swollen and the skin abraded, owing

to three separate attempts at reduction under chloroform by three different doctors. I prescribed a lotion of lead and opium. After four days I also tried reduction but failed. In these cases authorities recommend inserting a tenotomy knife near the midline of the toe behind, immediately above the base of the phalanx, and pushing it till it reaches and divides the glenoid fibro-cartilage of the joint. With all due deference to such authorities as Rose and Carliss, in these days of surgical lawlessness, I do not consider this good treatment. Cheyne and Burgard say that it is difficult to carry out the subcutaneous incision effectually, and recommend an open operation on the planter or palmar surface over the head of the metacarpal. This also I consider poor treatment. It is needlessly severe.

A far simpler and easier method dawned upon me when I failed in reducing the dislocation. It is to cut the extensor of the toe, then to hyperflex it, and pull it while in this position. In this manoeuvre the first phalanx acts as a pry with the head of the metacarpal bone as a fulcrum. The pry disengages the heads of the flexor brevis pollicis, the abductor and adductor pollicis, the long flexor tendon, and the capsule. When this is done a slight pull in the hyperflexed position and direction makes the phalanx slip into position over the head of the metacarpal bone, carrying all the displaced structures with it. I took the precaution to place two catgut ligatures about half an inch apart in the extensor tendon before dividing it. These are for the purpose of pulling the divided ends out of their sheaths. Otherwise one will have considerable difficulty in finding them. It is then a simple matter to suture the tendon, especially if cut obliquely or zigzag, and close the flap raised in exposing it. With ordinary antiseptic precautions this operation is as safe as it is simple and, in this case, effective. I imagine it applies to the thumb as well as the big toe.

COMPOUND FRACTURE DISLOCATION OF THE ANKLE JOINT

The old rule used to be, in compound dislocation of the hand temporize; in compound dislocation of the foot amputate. We have got far ahead of that since the use of tincture of iodine as an antiseptic. Limbs which I could not think of saving under the older antiseptics I now confidently try to save under the new. In justification take the following: A stevedore, age fifty-five, falls on the ice. After lying there half an hour he is picked up and brought to the hospital. I saw him soon after. He is filthy all over. On raising his leg the

foot hangs at right angles. When the dirty sock is removed the tibia juts out through a transverse rent in the skin, caused by a fractured malleolus. A thorough washing, a free application of tincture of iodine into every crook and cranny, a re-apposition with sutures in the torn skin, a few strands of silkworm gut as a drain, an outside splint, and healing results by first intention and recovery is uninterrupted.

Another case, over seventy, comes into the hospital with a similar injury. The foot hangs at right angles on raising the leg, the internal malleolus is fractured, the skin over it torn across. But here the astragalus was displaced and connected with the hanging foot. I could not replace it properly, and took it away. I soaked every part with iodine, replaced the foot, and drained with a few strands of horse hair. The skin did not heal by first intention, but gaped, exposing the posterior tibial tendon. A daily application of iodine was made. There was no suppuration. The tendon was removed piecemeal by scissors; healing took place by granulation, and recovery with fairly good ability to walk.

PIN-PRICK OR SCRATCH GANGRENE. By this term I designate the etiology of death *en masse* in patients whose vital forces are equal to nutrition but not to repair. Repair makes a heavier demand upon vital action than nutrition. There are patients with calcareous arteries, and others whose tissues are surcharged with sugar or urea or both, in whom vital action barely maintains nutrition, and to whom the slightest injury, or scratch is a formidable traumatism, causing ulceration and gangrene. In the words of the Good Book, the evil days have come, the keepers of the house tremble, the grasshopper is a burden (a figurative way of shewing that the slightest weight is a load), desire fails, and all the daughters of song are brought low because man goeth to his long home and the mourners go about the streets. Why introduce this here? Simply because you can ease the painful descent and postpone the evil day a little. You can successfully amputate gangrenous toes and save feet and legs by resorting to mild electric stimulation.

Take the following two cases out of several. One with hard arteries, the other with diabetes and Bright's disease. Both had gangrene of the big toe. Neither would listen to amputation of the leg which was recommended. They would "die first." "Can't you amputate the toe?" Very reluctantly I did so, at the metatarsophalangeal joint, explaining that in all probability it would only make matters worse, and hasten gangrene of the foot. All

this time though, I had something up my sleeve. As I told them, the wound broke down, became septic and began to spread. Now for my sleeve. I resorted to electric stimulation; slowly the aspect of things changed, the wounds began to heal. One went home with a slight sinus which closed shortly afterwards. He returned to his office, but subsequently died of his original trouble, diabetes and Bright's disease. There had been no recurrence of ulceration. The other after six years is still living, and looking after his farm in comfort.

You will be interested to know how to apply this electric stimulation. There is no great expense or complexity about it. Simply a copper and a silver disc connected by an insulated copper wire. The copper disc is laid over blotting paper soaked in weak vinegar. This is placed over the skin above the knee where the circulation is good. The silver disc is placed over the spreading sore with some gauze and a bandage over all. If you doubt its value, try it over any indolent ulcer and be convinced.

RESUME. The modern boot is not built on anatomical lines, and causes more pain, trouble, and deformity than most people are aware of. In the operative treatment of halux valgus, functional design is ignored by most authorities. Open section of the extensor hallucis is a simple operation, which permits of hyperflexion and easy reduction of dislocated big toe. The free application of tincture of iodine in compound fracture dislocations at the ankle joint will save many feet, otherwise doomed. The use of mild electric stimulation where vital action is sufficient for nutrition, but not for repair, will render amputation of a gangrenous toe a successful operation.

ERRATUM

UNFORTUNATELY, in the "correction" on page 989 of the November issue of the JOURNAL, the word *Liverpool* appeared instead of *Edinburgh*. Professor Crum Brown held the chair of chemistry at Edinburgh University for many years and it was at Edinburgh that he conducted his experiments on the function of the semi-circular canals.

THE PRENATAL CARE OF OBSTETRIC CASES

BY J. R. TORBERT, M.D.

Boston, Mass.

A CONNEXION of ten years with an institution actively carrying on one branch of medicine has seemed to the writer an excellent opportunity for critical review, to see where we have progressed and in what ways we have added to our ability to take better care of the patients in our charge. Surely in ten years certain definite advances should have been made, and as an actual fact much has been accomplished in obstetrics, the difficulty being to determine what to present to you in the time allotted me to-day. After mature consideration I have decided to bring to your attention what I consider the greatest advance we have made, and as it is fairly comprehensive, to discuss with you in detail the question of the hygiene of pregnancy. This is one of the most important questions in obstetrics, and as the subject is well covered in one department of the hospital, I thought it would be of interest to describe in detail the workings of what we call the Pregnancy Clinic of the Boston Lying-in Hospital. Prior to 1906, we had been open to criticism on the subject of prenatal care of our hospital patients, the subject being passed over as not being important, and the trouble and expense connected with it as being prohibitive. I think both of these statements may be disproved by following the results of the pregnancy clinic since its establishment. The subject of infant mortality and its prevention has loomed up large of late, and among the measures for its prevention those instituted to safeguard the child before and during its entrance into the world are of the greatest import.

The Out-patient Department of the Boston Lying-in Hospital was started in 1881. Beginning in a small way, the clinic has been nursed along until at the present time we are conducting about two thousand confinements in the homes of the poorer classes. These patients are delivered by medical students under competent supervision and the clinic is a part of the obstetrical department of the Harvard Medical School. The indoor service takes care of about

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nine hundred cases in addition. In 1891, the care and observation of pregnant women was emphasized by Dr. C. M. Green of the hospital staff in a monograph on the subject, and he deserves great credit for constantly keeping this subject before students, nurses, and medical societies.

In 1901, the Instructive District Nursing Association, working in conjunction with the hospital, began making ante-partum visits on some of the out-patients. This work gradually spread until 1906, when all of the patients were paid at least one visit by a nurse of this association some time between the date of application to the hospital and the confinement. In 1909, the Women's Municipal League began the experiment of intensive prenatal care of the house patients. These patients were visited by the nurse every ten days and not only were questioned as to the proper care of their bodies but were reassured and encouraged as well. This work was so successful and its need so clearly demonstrated that in May, 1911, the Pregnancy Clinic was opened for patients. Owing to lack of space in the hospital proper the clinic was first established in a tenement house opposite, but this year it had outgrown its quarters, and is now in more commodious ones in the hospital buildings. In the plans for our new hospital, now under consideration, this department has received careful consideration.

The present clinic consists of an office, waiting rooms, laboratory, table room, and a room for physical examinations. Patients in the out-patient department come directly to this clinic and remain under the care of this department until they start in labour, unless some serious complication arises which makes hospital treatment desirable. We are constantly urging upon our patients the importance of putting themselves under our care early in their pregnancy, but find it difficult to get hold of them much before the fifth and sixth months. The history of the patient is taken, both social and clinical, careful stress being laid upon the previous obstetrical history. The past medical history is gone into in detail. Here we enquire about previous diseases which may have left an imprint upon the patient's system. Among them are diseases affecting the heart, as rheumatism, tonsillitis, scarlet fever, diphtheria, etc., any diseases of the central nervous system; tuberculosis, pulmonary or bone; renal disease, etc. Attention to this past history will often avert eventual trouble which with early diagnosis and treatment can be properly controlled. Should the patient have passed through one or more confinements she is sent into the room for physical examination. The nurse secures a

specimen of urine on the way to this room. The physician examines the urine and takes the blood pressure. The abdomen is examined, the probable date of confinement estimated, and a complete physical examination made. External pelvimetry is done in all cases. The patient receives minute directions as to the hygiene of pregnancy, and is told to return in four weeks, or sooner if any untoward symptoms arise. She is told that if her symptoms are acute and should she need the attention of a physician, she is always to come to the hospital for treatment at any time of the day or night; or if she is to receive care in her own home, she is given a card which she can send to the hospital, and medical care will be furnished at once. The patient's name is then given the nurse who makes the follow-up visits; the pregnancy clinic nurse follows some of these cases, and this is the ideal arrangement. The nurse being present at the examination by the physician learns what to be on the lookout for in that particular case. When she comes to the patient's house it is not as a stranger but a friend that is welcomed. The influence of a nurse is far spread in a community, and her field for good in this direction indefinite.

Should the patient, however, give a history of previous difficult labour or should she be a primipara, she is referred to the table room where a careful vaginal examination is added to the complete physical examination previously described. Should the pelvis show marked contraction and the patient be at or near term, she is sent to the hospital for consultation with the visiting man on duty at the time. If she shows albumin in the urine or a high blood pressure, if the symptoms are acute, she is sent into the hospital for treatment. If the symptoms are mild, she is told to return to the clinic for examination in three days, five days, or at the end of a week. We find that most patients are constipated and that practically none of them are drinking enough water, and that when the fluid intake is sufficient and the bowels active, the urine becomes normal in the vast majority of cases. When the patient returns for her subsequent visits all the previous data are reviewed by the physicians, all symptoms that have developed since her last visit are recorded. Most of the patients return faithfully and seem to appreciate the services rendered.

Considering the various methods of examination used in the clinic, I wish to lay special emphasis on the abdominal palpation of the patient at or near term. A great amount of valuable information is obtained by this examination, the nearer the onset of labour the greater the value of the examination. Here we are able to determine the lie of the child, estimate the size, determine the existence of

multiple pregnancy, the viability and strength of the infant, and, most important of all, the relation of the presenting part of the fetus to the inlet of the maternal pelvis. After considerable experience in the use of this manœuvre I am convinced of its great importance and its value in the subsequent handling of the case when labour starts. With practice one becomes proficient in its use, and it is remarkable how much one learns from its systematic use. At the Boston Lying-in Hospital we are constantly being forced into doing hopeless operations on cases, sent in from outside, in which, had the practitioner a knowledge of this relation, no such condition would have arisen. Here again enters the question of system in examination and record cards; given a printed record with the headings of the facts to be ascertained, it is surprising how soon one gets to be expert in recognizing normal and abnormal presentations. Too little stress has been laid on this subject of ante-partum examinations both by obstetric teachers and textbooks, and this is only one of many points brought out in the pregnancy clinic.

The results of the clinic are interesting and instructive. Dr. J. L. Huntington of the staff of the pregnancy clinic has worked up this subject and I am indebted to him for permission to use his figures.

Beginning with the first case that made application after the clinic had been running for five months and the present system established, the records of one thousand cases have been carefully reviewed. Of this series, 609 cases were delivered in the patients' own homes by students, externes, and the out-patient staff of the hospital; 230 were delivered inside the hospital by the house staff. the remaining 161 who applied at the pregnancy clinic for treatment may be disposed of as not being pregnant, as having refused examination, as having been discharged to private physicians on request, discharged to other hospitals, delivered by midwives, or eloped. Of the 609 cases delivered in the out-patient department all but 44 were foreign born. One hundred and fifty-seven were pregnant for the first time, 452 had had one or more previous labours. The complications of pregnancy that these patients had, not severe enough in character to make it necessary for the patients to change their original plan of being cared for in their own homes, were as follows: 36 showed albumin in the urine without other signs of toxemia, and without a further diagnosis being made; 9 showed early signs of toxemia as well as albumin in the urine; 11 had moderately contracted pelvis; 5 showed heart lesions; 2 had syphilis; 1 had gonorrheal cystitis; 1 had bronchitis, and 1 threatened miscarriage.

To see the results of the work accomplished in this antepartum work it is necessary to follow these cases through confinement and the puerperium until discharged from the care of the hospital. Of the 609 cases, 545 had normal deliveries. The other results were: 21 low forceps and 18 high forceps operations; 11 breach deliveries and extractions; 6 versions and extractions; 6 twin deliveries; 1 adherent placenta and 1 miscarriage. The average length of time that the mothers were under the care of the department after delivery was 12·17 days. Six hundred mothers were discharged well; 5 were discharged to private physicians during the puerperium at their own request; 1 was sent to the tuberculosis hospital; 2 died, one with pulmonary embolism, the other with adherent placenta and post-partum hæmorrhage. The infants were under the care of the department for an average length of time of 12·19 days; 576 were discharged well; 3 were discharged to the Eye and Ear Infirmary with ophthalmia neonatorum and conjunctivitis; 2 to the Infant Hospital with bronchitis, and they subsequently recovered; 5 to private physicians on request of parents; 1 to the Massachusetts General Hospital with congenita syphilis; and 10 were premature. There were 14 stillbirths, 6 being macerated fetuses and 8 following operative deliveries. This would give a rate per 1,000 births of 22·9 stillbirths, which compares favourably with Boston's rate of 39·8, and the Borough of Manhattan's 48·6. Exclusive of the care of the confinement and of the services of the physician during pregnancy, the total cost of caring for 2,000 cases annually has been \$2,321.55 for the first year and \$2,221.55 for subsequent years. This is an average cost per patient of \$1.16.

We feel that the clinic fills a much needed want in our community and its possibilities are unlimited, of late it is being used with much success for teaching purposes by the Harvard Medical School.

The system of the clinic is very comprehensive and we feel that our physicians and nurses are much better fitted now for doing maternity work. Obstetric teachers strongly urge their students to develop some method of history-taking at the outset of their practice, which will assure their patient the greatest care during the pregnancy, and a study of which subsequently may be of profit to them. Should the physician not take up some methodical system of recording his cases at the outset of his practice, he is not likely to do so later. Of course it is not always pleasant to acknowledge one's errors upon paper, but one can learn as much or more from a subsequent study of such errors as from successes.

Case Reports

TUBERCULOSIS OF THE SPLEEN*

By J. HALPENNY, M.D.

Winnipeg

MRS. D., age thirty-one, was admitted to the Winnipeg General Hospital, November 11th, 1914; discharged November 26th, referred to me by Dr. Kippen, of Newdale, Manitoba. Has five children, all healthy, no miscarriages; youngest child seven months old. Patient noticed a lump in the abdomen just after last child was born, and thought it was pregnancy commencing again. She never told any one till three days before she came to the hospital. She was seen at that time by Dr. Kippen. At the time of taking the history she insisted that there were no symptoms except the presence of the tumour. She was in good spirits, looked well, except that she was pale and insisted that she had no pain, nor was there any tenderness on examination. There was a large, well-defined tumour on the left side of the abdomen. This mass at the upper end was hidden under the ribs and the lower end extended almost to Poupart's ligament. The outer border lay well out at the lateral abdominal wall. The inner border ran close to the umbilicus; at its upper end it was rather thick but toward the lower end thinned out considerably. Palpation from behind showed the area between the ribs and the crest of the ileum filled up. The mass was movable. It was firm. Near the umbilicus it was covered only by abdominal wall, as was the case to the left of the stomach. Otherwise it was covered by bowel.

She complained of nothing except the presence of the tumour. The urine analysis was normal. Unfortunately no blood count was taken before operation. In the notes made at this time was the following: "It is not pancreas, not from the gastro-intestinal tract, nor does it seem to be a gas cyst of the omentum. It may

*Since this paper was written Dr. Adami has examined slides and writes as follows: "Even though you have been unable to transmit the disease to guinea-pigs, the picture is such that I must label the condition 'Tuberculosis.' I do not know any other condition that would produce this picture."

be spleen but more likely kidney. We will explore the abdomen first, however."

At operation the incision was made along the right rectus. The tumour was at once seen to be the spleen and resembled, in gross appearance on its surface, an ordinary tubercular kidney. It was not adherent. There were some enlarged glands along the mesentery of the ileum which were not disturbed for fear of endangering the circulation of the bowel. The removal of the mass was very easy. There was considerable bleeding from the abdominal wound, but none from the pedicle. The other abdominal organs were normal as was the peritoneum.

Forty-eight hours after the operation, the temperature reached 101° , the respirations 36 and the pulse 120. After this the convalescence was smooth and the patient left the hospital fifteen days after the operation. Blood counts were taken on the day following the operation and on the third, sixth and ninth days. The first count showed 27,000 white cells; second count red cells 4,120,000; white cells 19,000. Out of 100 white cells counted, 89 were polymorphonuclears, 9 were large mononuclears and 2 were eosinophiles. The hæmoglobin was 80 and the colour index was .97. The third count showed 16,400 white cells with 94 per cent. polymorphonuclears. The last count showed 4,500,000 red cells and 10,400 white cells. The hæmoglobin was 80 and the colour index was .87. The patient had been out of bed about six days before she left the hospital and went directly to her home some two hundred and fifty miles distant.

The pathological report by Dr. Sidney J. S. Pierce was as follows:

Specimen consists of an enlarged spleen. Size $20 \times 33 \times 5$ cm., weight 950 grammes. Over the surface and throughout the pulp are numerous nodules of the size of a hazelnut. These are of soft consistence and red colour. Those on the surface show a greyish centre but there is no caseation.

Microscopic sections of nodules show a somewhat myxomatous structure. In this are numerous tubercles consisting of a small necrotic area surrounded by a zone of epithelioid cells. Giant cells are very numerous.

Diagnosis: Tuberculosis.

Biological examination: Guinea-pig injected intraperitoneally with emulsion of spleen pulp, remained in apparent health and increased in weight. Killed ten weeks later. On autopsy, no sign of disease.

Tuberculosis of the spleen is rare. Franke,¹ in 1906, collected twenty-nine cases; ten were operated on, with seven cures. In 1909 Fischer² collected twelve cases. Possibly these two groups overlap. Bland-Sutton³ reported one in 1913, and Mayo⁴ one in the same year. The writer was unable to find any cases reported in Canadian literature.

Bland-Sutton regards tuberculosis of the spleen as always secondary to a primary focus in some other organ. Mayo says his case was primary. In the case here reported all one can say is that no clinical focus was found elsewhere.

The pathology in these cases is somewhat debated. Wilson,⁵ in his review of the available material at the Mayo clinic, classed one case as tuberculosis until he got what he regarded as negative results by "examination of alcohol-fixed material stained for tubercle bacilli and of three guinea-pigs inoculated with fresh spleen." Giffin⁶ classed one case, evidently operated on early in their series, as tuberculosis. This is no doubt the case referred to by Mayo the same year. Wilson evidently did not have this particular spleen for examination for his summary.

In Wilson's list of Gaucher spleens his second case, A 9315, was at first regarded by him as tuberculosis but on finding no tubercle bacilli, and further having had three negative results on inoculation of guinea-pigs, he later made a diagnosis of the Gaucher spleen. Brill and Mandelbaum⁷ had the opportunity of examining the slides from this case, and they say: "The resemblance to a tuberculous lesion is most striking, even though distinct tubercles are not seen." In a footnote to Brill and Mandelbaum's article the following evidence is given that Wilson's second case was a tuberculous spleen, not one of the Gaucher type: "Since the above was written, with the kind permission of Wilson, the slides of his three cases were submitted to Marchand for an opinion. Marchand writes that Wilson's first case is a typical splenomegaly of the Gaucher type. He agrees that the second case is one of tuberculosis, even though tubercle bacilli could not be demonstrated in the sections or by animal inoculation."

In order to settle as nearly as possible the diagnosis in our case, Dr. Pierce was good enough to submit the specimen and slides to Dr. Gordon Bell of our college. He gave it as his opinion that the case was undoubtedly one of tuberculosis. Dr. Adami, while on a visit to our city, gave the same opinion, adding that he thought it was of the avian variety of tuberculosis. Slides were also sent to Dr. Mandelbaum, who wrote to Dr. Pierce as follows: "There

can be no question but that it is a case of nodular tuberculosis. It is almost an exact counterpart of Wilson's case, which he reported as one of Gaucher's disease, and in which he also failed to find tubercle bacilli. Although the lesion in your case is somewhat more advanced than Wilson's, the resemblance is very striking and the process is identical."

With the evidence here presented it would seem a safe diagnosis when this case is called tuberculosis of the spleen. The patient is now in good health.

In conclusion, I wish to express my great appreciation of Dr. Pierce's usual painstaking care and assistance in clearing up the diagnosis; also to Drs. Bell, Adami and Mandelbaum for examining the specimen and giving their opinions.

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THE general financial situation is being felt severely by the hospitals of Montreal, all of which are dependent in large measure on private contributions. The General, Notre Dame, and Western Hospitals are face to face with a deficit amounting to \$85,000, and are in a more critical position than ever before. The deficit of the Montreal General alone is \$67,013. A delegation of representatives from these institutions recently waited on the Board of Control to request that the deficit be paid by the corporation of Montreal. The matter was promised careful consideration.

Editorial

THE LATE PROFESSOR MINES

MCGILL UNIVERSITY and physiological science have received a rude and painfully sudden shock in the recent death of Professor G. R. Mines. Among the younger generation of physiologists there was none more brilliant, none of greater promise. And now in a moment all that is past. The very suddenness of his death as the result of a risky experimental observation, which in his enthusiasm—and, we must sadly confess, most culpable unwisdom—he was performing upon himself in the solitude of a medical college on a Saturday afternoon, is tragic. Had it come to a man whose life work had been accomplished, or who had been a failure in any one of his relationships towards society the tragedy would have been mitigated. Young, sound in health, buoyant and delighting in his new surroundings, with a personal charm that attracted all towards him, with a record of investigations accomplished such as good men twenty years his senior would be proud to own, and with high hopes for the future, in such an one the tragedy is unrelieved. We can only console ourselves after the manner of those of old, by realizing that he was one whom the gods loved. Certainly few men have evoked a warmer personal liking, not to say affection than came to him at Cambridge, in Toronto, and during his brief weeks in Montreal.

The outstanding details of his life are few. Born at Bath, Somersetshire, in May, 1886, his early education was obtained first at Bath College, and later when his father's position as one of H. M. Inspectors of Schools called him to East Anglia, at the Grammar School, King's Lynn. As a boy he showed an intense passion for music, and at Lynn a well-known amateur offered to direct his musical education, being

convinced that he would attain the very highest rank as a musician. But when the family moved to Hereford, he came under the influence there of Dr. P. M. Chapman, who recognized his remarkable gifts and so stimulated his liking for natural science that he persuaded him to take this for his career, and to this end Mines prepared himself for Cambridge, gained an entrance scholarship at Oliver Cromwell's old college, Sidney Sussex, in 1904, had a brilliant undergraduate course, and in 1909 was elected to a Fellowship of his college, becoming there director of natural science studies. At the same time he was a member of the teaching staff of the physiological department of the University.

Along with James Mackenzie, Chapman, of Hereford, was one of the pioneer physiologist physicians: twenty years ago in his Goulstonian lectures he demonstrated the usefulness of the cardiograph and chronograph in routine practice. And doubtless it was his strong influence that led Mines to physiology, and particularly to cardiac physiology. It is in the development and interpretation of exact methods of record of heart action that Mines made his mark: the investigation of the different curves of the electro-cardiogram, their relationship and significance, the effects of electrolytes and of hydrogen-ion concentration upon the cardiac cycle, and, as intimately associated with the subject, the investigation of the nature of muscular contraction in the light of the newer colloid chemistry. To pursue his studies upon the hearts of lower animals, he spent his vacations at the Marine Zoological Stations at Plymouth, Rostock, and Naples. Quickly seizing upon the value of the cinematograph as a record of animal movements, he made himself a master of its technique and worked at the newly opened Marey Institute at Boulogne. One of his latest papers is illustrated by a succession of cinematograph photos of the contractions of the frog's heart. He had a capacity amounting to genius for devising methods and instruments of exact record. We would recall his novel—and singularly simple—apparatus for employing a pocket watch for a time marker, and his method, published recently,

of employing the dictaphone—the “Chronodictaphone”—to record at the precise moment the necessary notes to be made in the course of a physiological record. In his all too short period as an investigator he had published some forty-five scientific papers.

The last winter was spent by him in Toronto as temporary assistant to Professor Brodie, he being attracted there by the activity of research and admirable equipment of the physiological laboratory. It was at the end of last session that he was appointed to the vacant chair at McGill University, and only this autumn that he took up the work at Montreal.

This is not the place to dwell upon what his loss means to his young widow and her two little children, beyond expressing the deepest sympathy for them left thus bereft of support.

THE WOUNDED

[T is evident from the reports in the English medical weeklies now coming to hand, that the arrangements for treating the sick and wounded have much improved, and are working with a wonderful smoothness and efficiency. Even at the first everything seems to have been done that was humanly possible, and those who criticized had little real knowledge of the magnitude of the difficulties which the medical services had to face. There is now sufficient hospital accommodation for present needs, and the personnel of most of the hospitals exceeds the regulation requirements. A gratifying feature is the number of physicians and surgeons of experience who have volunteered and who, in many instances, are content to occupy subordinate positions. The facilities for transporting the wounded have greatly increased. Instead of a journey of perhaps four days in improvised cars, the transfer from the front to the base is now a matter of hours, and the special ambulance trains are virtually travelling hospitals. Many

of the less severely wounded are taken to England without passing through the base hospitals, being transferred directly from these trains to the hospital ships, which are large transformed liners with practically all the conveniences of a base hospital.

This may partially explain the statement of a correspondent, who writes from a base hospital in France, that "possibly a majority of the wounds are of almost incredible severity." But more surprising than this, and more disquieting, is the nature of the infecting agents. The ordinary pyogenic organisms are conspicuous by their absence, or at least by their unexpected rarity, but their place is taken by the deadlier anaerobes, such as the bacilli of tetanus, malignant oedema, and the aerogenes capsulatus. Moreover there would seem to be at least one anaerobe which is causing gangrene and which is new to experienced bacteriologists. Certainly it is difficult to identify it with known forms. The explanation offered is the intensive cultivation of the soil in France and Belgium; such a soil, everywhere thoroughly manured for centuries past, constitutes a congenial habitat for the anaerobic organisms.

Paradoxical as it may seem, the very prevalence of tetanus has rendered inadvisable the routine prophylactic use of the antitoxin; but only by strict economy can the threatened exhaustion of the available supplies of the serum be postponed. The usual practice is, therefore, not to give it till the first warning symptom, whether doubtful or not, makes its appearance. Some undoubted cases are reported cured by what would be considered small quantities of antitoxin, e.g., two or three doses of 20 cc. in a period of ten days.

The wounds caused by shell fire are often extraordinarily extensive; but many unexpected recoveries are recorded, even when the brain or the abdomen has been shockingly injured. Rifle bullets, which often make small, clean-cut wounds, not rarely cause complete shattering of a bone with wide laceration. This is particularly the case when the firing

is at short range, and it is probably wounds thus received that have given rise to the accusation of using dum-dum bullets. In these modern battles lasting weeks, and often without respite even at night, many of the wounded have lain in the trenches untended for more than a day, sometimes with little or no food or water. It is obvious that their wounds are infected from the start. Hence it is that the surgeons have had to return to early Listerian principles of treatment. Asepsis gives place to a vigorous antiseptis. Strong iodine and hydrogen peroxide are amongst the commonest agents used, especially by the French; iodoform, carbolic and permanganate are also favourite dressings. From wounded soldiers who were taken by the Germans and afterwards recaptured it is learned that in nearly every case they were kindly treated by the enemy. On the other hand some report that they were robbed of the little food they happened to have with them, or that they were stripped of their greatcoats: Happily such instances are rare.

So far there has been very little sickness. In one of the largest of the home hospitals, up to the end of October, only one case of typhoid had been received from the front. The health of our Canadian troops, as of the rest of the vast army under training in England, has been good. On page 1119 will be found interesting letters from two of our colleagues. Apart from a few cases of meningitis, what sickness there is, is of a nature incidental to the life of exposure.

A LETTER FROM THE FRONT

IN a letter to Professor Adami, dated October 29th, a well-known Dublin pathologist gives the following interesting description of his varied activities in France: "I volunteered on the declaration of war and have had a good deal of work to do. At first I was attached to a general hospital as pathologist and physician. We opened eight hundred beds at Havre, and then came the retreat on Paris and we had to evacuate.

We went then to St. Nazaire at the mouth of the Loire, and did not open up, but stood by at putting wounded on to the ships off the trains. This went on for three weeks, and I was in a state of extreme depression as I thought I would never get up near the front. At last I was sent up and told to equip myself as a mobile laboratory, which I did in Paris, and went up to Braisne near the Aisne, where I was to start at the early diagnosis of enteric and, if possible, the anaerobe which was causing so much gangrene. The latter was an almost impossible task, but I got a lot of positive blood cultures and, more important still, I was able to exclude a very large number of doubtful cases. I got malignant œdema in the heart's blood of one man but had not any way of properly verifying it. We then moved to the new front where we are now—I may not name places, but you probably know quite well—and there we were greeted with the news that there would probably be two thousand wounded the night we arrived. I was asked to run a hospital, and myself and another man took a school and started in. In our first four days we put through seven hundred and twenty cases, of which about three hundred and twenty-five were lying down cases. On one day we had seven compound femurs and quite double that number of tibias. The reason of this was that they were attacking instead of being in the trenches and so they got far worse injuries. There is less gangrene and less tetanus in this country than on the Aisne, where tetanus is notorious in civil practice. We give serum to almost all the shell cases and chance the bullet wounds. There has been a lot of tetanus. In three weeks, at one general hospital, after the Marne and the first fortnight of the Aisne, when stores and equipment were hard to get, they had 65 per cent. of their deaths from tetanus. I don't think there is much true dysentery yet, a few cases of diarrhoea but not the real organism (whichever that may be).

“We hear all sorts of tales about the Germans but there is no doubt that the white flag dodge is continually being used.

Also they come along singing the *Marseillaise*, which is misleading. Our men got them at it the other night, having been caught out about a week before, and wiped out the lot. We got shelled in Braisne and I can't say I like it. One shell frightened me badly; I heard him coming up the street and apparently slowing down. I was sure it was a half volley. It pitched about forty yards away and knocked a hole in the church. I expect you have had enough, but I thought you might like to hear something not in the papers. Excuse the paper; it is one of the exercise books of the school children."

MEDICAL ASSISTANCE IN OUTLYING DISTRICTS

THE provision of medical assistance in outlying districts in the western provinces of Canada is by no means an easy matter. The difficulties encountered include the great distances to be traversed, frequently in the most inclement weather, the inability of those requiring medical aid to pay an adequate sum for such assistance, and the scarcity of practitioners willing or in a position to enter upon a life of hardship and meagre remuneration. An almost parallel case is found in the Australian bush and it is of interest to know what is being done there. In the issue of October 17th of the *Medical Journal of Australia* an account is given of the manner in which it is proposed to meet the needs of the bush districts in New South Wales. It is the intention of the Minister of Public Health to place well-trained nurses in districts which are out of reach of a medical practitioner and too sparsely populated to make it possible for a medical man to practise there. In some districts the local community will defray the necessary expenses, or part of the expense, and it is estimated that a permanent subsidy of about \$400 a year for each district will meet the needs of the situation. Provision of course must be made for cases of childbirth and the nurse appointed should be a well-trained and thoroughly efficient midwife. The difficulty of obtaining a sufficient number of such nurses is

apparent at once and danger will arise if partially trained women are employed. It is intended that medical practitioners shall pay periodic visits to these districts and shall be prepared to go there on emergency calls. If necessary the government will pay a special fee for an urgent call, but the urgency is to be determined by the nurse and not by the patient. A practitioner will be established in places with a population of one thousand and over and an income of \$3,000 will be guaranteed, partly by the government and partly by the local residents. The doctor undertakes to attend everyone in the township and those able to do so will be expected to pay an adequate fee for his services; the local guarantors will see that he is paid the fees charged and at the end of the year, and should the amount received by the doctor be less than the amount guaranteed by the local committee, the deficit will be paid. For instance, should the local residents guarantee an income of \$1,500, the additional sum of \$1,500 to make up the stipulated income of \$3,000 will be paid by the government. Should the income received by the doctor exceed the amount guaranteed locally, however, the government grant would be reduced in proportion. In certain areas, of course, special arrangements will have to be made but the proposed arrangements have much to commend them and are worthy of the consideration of those responsible for the welfare of Canadians living in the far-away districts of the West.

IMPORTANT contributions have been made of late years to the theory and practice of surgical anæsthesia but the complete scientific development of this branch of medicine has been somewhat hampered by the want of a suitable journalistic medium. This condition is now to be remedied for, commencing with the present month's issue, a supplement to the *American Journal of Surgery* will be published under the able editorship of Dr. F. Hoeffler McMechan, of Cincinnati, one of the founders of the American Association

of Anæsthetists. The supplement has been adopted by the latter society and by the Scottish Society of Anæsthetists as their official organ; it will be a complete journal within a journal, containing editorials, contributed articles and communications, abstracts, transactions of societies, and book reviews.

THE Wisconsin Marriage Law, which provides for a medical examination of "all male persons making application for license to marry," has been in force since the beginning of the year. The weight of opinion seems to be that it was a premature and ill-digested piece of social legislation. It was also attacked as unconstitutional, and the court of first trial upheld the attack. The weekly report of the United States Public Health Service, Vol. 29, No. 37, publishes the opinion of the chief justice of the Wisconsin supreme court upholding the so-called "eugenic marriage law," and also the dissenting opinion of two of the members of the court. "The case really turned on whether or not the language of the law required the application of the Wassermann test. . . . The majority of the court held that the legislature did not intend to require the Wassermann test." The statute as thus interpreted would appear to be about as useless as its opponents have always declared it to be. *Leges sine moribus vanæ*. And yet, in spite of the probable failure of the legislative experiment, its educational value, in view of the universal interest it has aroused, must be considerable.

POISONING by wood alcohol continues to claim its victims and the inadequacy of the legal provisions in the United States in this matter is much to be deplored. The recent tragedy in Vermont in which fourteen persons were killed and a number of others blinded by drinking whiskey adulterated with wood alcohol, coupled with the occurrence in New York when three persons succumbed and others became blind after drinking

anisetette consisting largely of wood alcohol, serves to increase the importance of this question. The blame would appear to attach to the producers of wood alcohol who put it on the market in a form closely resembling grain alcohol, or Cologne spirits, and under the name of colonial spirits. To make the deception more complete, the latter is frequently abbreviated to col. spirits and sold instead of the non-poisonous Cologne spirits. An effort was made during the last session of the New York State Legislature by the Committee for the Prevention of Blindness to have a Bill passed to prevent such poisoning, and the danger of confusing Cologne and colonial spirits was emphasized by the president of the State Pharmaceutical Association. Unfortunately the Bill was defeated. In the city of New York the department of health now requires all forms of wood alcohol to be labelled "wood naphtha" and to bear a poison label, but even in New York nothing has been done to prevent poisoning by the inhalation of wood alcohol fumes in the industries.

THE Cochrane Hospital Board has now about \$10,000 in hand and it is the intention that the construction of a hospital shall be commenced next spring. The board has received most of the equipment required for a twenty roomed hospital from the Northern Ontario Relief Committee. It will be remembered that after the fire of 1911, a sum of money was subscribed for the relief of those in straightened circumstances as a result of the fire in the Porcupine district. Part of this money—\$20,000 approximately—remained in the hands of the Northern Ontario Relief Committee and, in 1912, a request was made by the people of Cochrane that this sum be expended on the erection of a hospital at Cochrane. This the Relief Committee was prepared to do on condition that about \$4,000 of the amount was distributed among the Porcupine hospitals. The latter, however, objected and the matter was taken to law, with the result that the money was divided equally between Porcupine and Cochrane.

Book Reviews

SEROLOGY OF NERVOUS AND MENTAL DISEASES. By D. M. KAPLAN, M.D., director of clinical and research laboratories of the Neurological Institute, New York City. Octavo of 346 pages, illustrated. Philadelphia and London: W. B. Saunders Company, 1914. Cloth, \$3.50 net.

Dr. Kaplan appears in this book to have said the last word which can be said at the moment upon the use of sera in nervous and mental diseases. This word is of great authority as it utters the voice of the Neurological Institute of New York. Also this is the first occasion, so far as we are aware, on which the scattered literature on the subject has been brought together in a well ordered form. The writer will undoubtedly meet with the approval of physicians, particularly neurologists and psychiatrists, in supplying them with a volume to satisfy their questionings. The historical element in the book is strong, and there is an adequate record of human thought and human achievement in this division of medical practice. Part I is devoted to technology. Part II deals with the serology of nervous and mental diseases of nonsyphilitic etiology; and Part III deals with the serology of those affections which are due to the specific organism of syphilis. The last section is an extraordinary complete discussion of the therapeutic use of salvarsan. The bibliography occupies seventy pages and includes everything of importance which has ever been written upon the subject. It is a most workmanlike book, and the profession is under a heavy obligation to Dr. Kaplan for this arduous labour which he has carried to so successful a conclusion.

DISEASES OF THE RECTUM AND ANUS. A PRACTICAL HANDBOOK.
By P. Lockhart-Mummery, F.R.C.S. London: Baillière, Tindall and Cox, 1914.

This book has a special claim to recognition. The material on which it is based has been drawn from St. Mark's Hospital, where the practice is confined to diseases of the bowel. In the course of a year seven thousand five hundred cases are treated, and six hundred and fifty are admitted to the wards. The author

is senior surgeon, and he has utilized the material as well as that arising in his private practice to the fullest extent. The book is quite new. It does not, of course, attempt to include all recently recorded work upon the subject, or even to summarize it. It sets forth, rather, those operations and methods of treatment which have been found in experience of the most value; and it does so in clear terms so that they can be apprehended by any student or practitioner.

A MANUAL OF PRACTICAL HYGIENE. By CHARLES HARRINGTON, M.D., late Professor of Hygiene in the Medical School of Harvard University. Fifth edition, revised and enlarged by MARK W. RICHARDSON, M.D., Secretary to the State Board of Health of Massachusetts. Octavo, 933 pages, with 125 engravings and 24 plates in colours and monochrome. Cloth, \$5.00, net. Lea & Febiger, publishers, Philadelphia and New York, 1914.

The revision of this, the fifth edition of Harrington's "Practical Hygiene," has been undertaken by the Secretary to the State Board of Health of Massachusetts in collaboration with the Chief Chemist, the Chief Engineer, the Assistant to the Secretary, the Chief Analyst of Foods and Drugs, and the former Secretary for the Massachusetts State Board of Education. It will readily be understood that when so many trained collaborators set their hands to such a task that the work would be well done, especially when they had to deal with so valuable a ground-work. Hygiene has become a new subject within the past ten years, and its range has become so enormous that it requires a varied talent for its elucidation. This book is the work of expert hands and contains the best that has been done, and thought, upon the subject. It covers the whole range of industrial life, and is really a treatise upon modern civilization. To Military Hygiene and correlated subjects, a large section is devoted, and the finest details of the soldier's life are investigated. It is worthy of remark that the personnel of the German Medical Service is about double in number that of the English army. The book is not for the profession alone. It should be read and kept for constant reference by all others who are interested in the maintenance of the public health. It is a splendid achievement of American science.

Books Received

The following books have been received and the courtesy of the publishers in sending them is duly acknowledged. Reviews will be made from time to time of books selected from those which have been received.

A TREATISE ON DISEASES OF THE NOSE, THROAT, AND EAR. By WILLIAM LINCOLN BALLENDER, M.D. Price, \$5.50 net. Philadelphia and New York: Lea & Febiger, 1914.

THE INFANT: NUTRITION AND MANAGEMENT. By ERIC PRITCHARD, M.A., M.D., M.R.C.P. Price 3s 6d. London: Edward Arnold, 1914.

MENTALLY DEFECTIVE CHILDREN. By ALFRED BINET and TH. SIMON, M.D. Authorized translation by W. B. DRUMMOND, M.B., C.M., F.R.C.P., with appendix containing the Binet-Simon tests of intelligence by MARGARET DRUMMOND and an introduction by PROFESSOR A. DARROCH. Price 2s 6d. London: Edward Arnold, 1914.

PHYSIOLOGICAL PRINCIPLES IN TREATMENT. By W. LANGDON BROWN, M.A., M.D., F.R.C.P. Third edition. Toronto: The Macmillan Company of Canada, Limited.

NERVOUS AND MENTAL DISEASES. By JOSEPH DARVIN NAGEL, M.D. New (92nd) edition, revised and enlarged with fifty engravings and a coloured plate. Price \$1.00 net. (The Medical Epitome Series). Philadelphia and New York: Lea & Febiger, 1914.

PRACTICAL THERAPEUTICS. With especial reference to the application of remedial measures to disease and their employment upon a rational basis. By HOBART AMORY HARE, M.D., B.Sc. New (15th) edition, thoroughly revised and rewritten. Octavo with 144 engravings and 7 plates. Price, \$4.00 net. Philadelphia and New York: Lea & Febiger, 1914.

AN EPITOME OF PEDIATRICS. By HENRY ENOS TULEY, A.B., M.D.
New (2nd) edition, revised and enlarged. Price \$1.00
net. (Lea's Series of Medical Epitomes.) Philadelphia
and New York: Lea & Febiger, 1914.

A TEXT-BOOK OF THE DISEASES OF THE NOSE AND THROAT. By
JONATHAN WRIGHT, M.D., and HARMON SMITH, M.D.
Octavo with 313 engravings and 14 plates. Price \$5.00
net. Philadelphia and New York: Lea & Febiger, 1914.

**THE BALNEO-GYMNASTIC TREATMENT OF CHRONIC DISEASES OF
THE HEART.** By PROFESSOR T. SCHOTT, M.D., with fore-
word by JAMES M. ANDERS, M.D., LL.D. Illustrated.
Price \$2.50 net. Philadelphia: P. Blakiston's Son &
Company, 1914.

A MANUAL OF NORMAL HISTOLOGY AND ORGANOGRAPHY. By
CHARLES HILL, Ph.D., M.D. Third edition, thoroughly
revised; illustrated. Price \$2.25 net. Philadelphia and
London: W. B. Saunders Company, 1914. Canadian
Agents: The J. F. Hartz Company, Limited, Toronto.

MANUAL OF OBSTETRICS. By EDWARD P. DAVIS, A.M., M.D.
Illustrated. Price \$2.25 net. Philadelphia and London:
W. B. Saunders Company, 1914. Canadian Agents: The
J. F. Hartz Company, Limited, Toronto.

**PRACTICAL BANDAGING, INCLUDING ADHESIVE AND PLASTER-OF-
PARIS DRESSINGS.** By E. L. ELIASON, A.B., M.D. Illus-
trated. Philadelphia and London: The J. B. Lippincott
Company, 1914. Montreal: Charles Roberts.

**REPORT FROM THE PATHOLOGICAL DEPARTMENT AND THE DEPART-
MENT OF CLINICAL PSYCHIATRY, CENTRAL INDIANA HOS-
PITAL FOR INSANE, Volume 5, 1911-1912 and 1912-1913.**

THE CATECHISM SERIES. PART 1, BOTANY; PART 2, MEDICINE.
Second edition, revised and enlarged. Price 1s each.
Edinburgh: E. & S. Livingstone, 1914.

Men and Books

BY SIR WILLIAM OSLER, BART., M.D., F.R.S.

XXVI. NATHAN SMITH. Readers of my occasional essays will recall how frequently I have referred to Dr. Nathan Smith as one of the pioneers of clinical medicine in the United States. Many years ago his *Practical Essay on Typhous Fever*, New York, 1824, fell into my hands, and I have always praised it as a model of accurate clinical description. He recognized that the autumnal fever of the United States was "a disease *sui generis* arising from a specific cause, and that cause contagion." At Baltimore I was not a little interested to find that the leading practitioner of the city and one of the trustees of the Johns Hopkins Hospital was Dr. Alan Smith, a grandson of Nathan Smith. To him and to his family I was indebted for many acts of great kindness. One evening at his house Mrs. Smith brought out a box of family documents, which I saw at once had a unique value. They told the story of Nathan Smith and his association with the profession in New England, and particularly with the founding of the medical schools of Dartmouth, Yale, Burlington and Bowdoin. I forget whether it was then or later that I urged Mrs. Smith to put this material together and tell the story of one of the great names in the history of the profession in the United States. This she has now done in a charming volume issued from the Yale Press,* with an introduction by Professor Welch. I saw enough of the correspondence to appreciate how valuable the records were for the history of medicine for the period between 1780 and 1830. It is a splendid story, well told in the best possible way, largely in first-hand letters. As Dr. Welch remarks, we have here presented a splendid picture of Nathan Smith's life, "of his struggles and trials, of his indomitable courage and resourcefulness, of his marvelous capacity for work, of his professional and educational ideals and activities, and of his triumphs. We catch intimate glimpses of the active-minded lad upon the frontier, of the student at home and abroad getting, in spite of great difficulties, a good medical training, of the lover

* *The Life and Letters of Nathan Smith*, by Emily A. Smith, New Haven, 1914.

'transported with joy and expectation,' of the devoted husband and father, solicitous for the education of his sons, of the busy physician and surgeon, 'bandied about from one part of the country to the other,' treating fevers, couching for cataract, cutting for stone, excising tumours, and embarrassed most of the time, as is the way of doctors, from failure or inability to collect his fees, small as they were, of the founder of medical schools and the professor, filling and filling well all the chairs in the medical curriculum,—from all accounts a really great teacher, and withal deserving President Woolsey's characterization of him as 'the most delightful, unselfish and kind-hearted man I ever knew, and we children all loved him.'"

I remember how strongly I was impressed by the letters between Nathan Smith and George Cheyne Shattuck, of Boston, the father, grandfather, and great-grandfather of the Shattucks who have helped to make the profession of Boston famous during the nineteenth century. Smith's letters show the energy and perseverance with which he set about the establishment of the Dartmouth Medical School. He taught anatomy, surgery, chemistry, and the theory and practise of medicine. Mr. Abraham Flexner in his report on American medical education speaks of him in relation to Dartmouth as a man who "was its entire faculty, and a very complete faculty at that." The classes increased with rapidity, so that in 1809 there were one hundred students. One of the chief struggles was to get material for dissection, as in those days "the cutting up of dead bodies was a grievous offence to the public." One of Dr. Smith's chemistry lectures brought out the following unique prayer from President Wheelock, who came to college chapel direct from chemical class-room:

"Oh, Lord! we thank Thee for the Oxygen gas; we thank Thee for the Hydrogen gas; and for all the gases. We thank Thee for the Cerebrum; we thank Thee for the Cerebellum, and for the Medulla Oblongata."

It is nice to know that Nathan Smith's name has been honoured at Dartmouth in connexion with the splendid new laboratory for chemistry and pathology.

Largely owing to Smith's untiring energy and ability as a practitioner and teacher, the reputation of the Dartmouth school increased with great rapidity, and it is not surprising that in 1813 he was called upon by Yale College to help in the establishment of a medical school at New Haven. Opening with thirty students the school grew rapidly under his fostering care. It is interesting to

note that in connexion with it he early planned a botanical garden. It was not until 1817 that he severed his connexion finally with Dartmouth, and moved to New Haven. In 1821 he helped to found the Maine Medical College at Bowdoin, and lectured there for ten weeks in each year on anatomy, surgery and medicine, from 1821 to 1823. It was at this period that he did one of the notable operations in surgery, not knowing that it had been done before by McDowell—the successful removal of an ovarian cyst. In 1820, he helped his son, Nathan R., to organize the medical school at Burlington, Vermont. Nor did his energy in establishing schools end here, for his services were enlisted in the founding of the Jefferson Medical College, Philadelphia, in which his son, Nathan R., and Dr. George McClellan took a leading part. Early in 1829 he had a stroke, which fortunately carried him off without a long illness.

Nathan Smith was of the very best type of New England physician, of untiring energy, strong mental and moral qualities, and characterized above all by good plain common sense. His name deserves to be held in reverence, and I am sure this story of his life, so well told by the widow of his grandson, will be warmly appreciated by the profession.

THE following is a list of candidates who have passed the final examination of the College of Physicians and Surgeons of Ontario: Vernon H. Craig, Kingston; John Albert Dobbie, Kingston; Franklin Mortimer Durr, Uxbridge; William Gordon Hamilton, Elgin; Samuel Ross Delap Hewitt, Toronto; Richard Earl Hopkins, Toronto; John Nelson Humphrey, Tara; Edmund Percy Lewis, Toronto; Reginald Allen Matthews, Toronto; William Verne McIntosh, Windsor; Alex. McLeod, Bayfield; Ernest Alexander McQuade, Toronto; Frank Harten Pratten, Toronto; George Alonzo Simmons, Simmons, Que.; Harold Chester Sutton, Cooksville; William John Taugher, Prescott; Harold Murchison Tovell, East Toronto; Edmund Coulter Syer, Pontypool; William Virgil Watson, Toronto; Charles Frederic Williams, Cardinal; Robert Roy Wilson, Toronto; Clarence Francis Wright, London.

Res Judicatæ**HEALTH, INSURANCE AND THE MEDICAL
PROFESSION**

TO obtain the services of the medical profession for the benefit of the sick of the poorer classes has been the object of many a philanthropic movement. The free clinic and the endowed hospital, both expressions of philanthropy, are made possible by securing the free services of medical men. The fraternal organizations as we know them are an indication on the part of the masses that they would prefer to pay their own way if such were possible. In Great Britain the matter has been deemed sufficiently important for a government to make it the subject matter of legislation. All we require in Canada or the United States is the right type of politician and it will be made the subject matter of legislation on this side of the Atlantic.

The free clinic and all similar institutions are made possible by exploiting the medical profession either in the name of charity or religion. In Great Britain, Mr. Lloyd George, in introducing the National Insurance Act, practically stated that the medical profession should not be so exploited and then went ahead and exploited it in the name of politics.

The medical profession has made great progress in all the sciences pertaining to the healing art, but the business side of the practice of medicine has remained unchanged for generations. A fair percentage of patients pay us a full fee, a few pay us a partial fee, and more than a few pay us nothing at all. It is estimated that 33 per cent. of the urban population of Great Britain was affected by the National Insurance Act. I notice that the percentage of population of any fair-sized city on this continent which seeks its medical attention through the free clinic, the free hospital wards, the fraternal society, the contract physician, or the general practitioners' charity list, is placed by many men as fairly high; some say as high as 50 per cent. Scarcely ever do I find it placed as low as 25 per cent. It seems reasonable, therefore, to conclude that if legislation similar to the National Insurance Act of Great Britain were copied in either Canada or the United States, as large

a portion of the population would be affected. In other words, the profession is receiving nothing for 33 per cent. of its work, for work that is worth more to the public than it ever has been before, at a time when the average medical income is on the decrease and the cost of living on the increase. We are living in an age when the "gold standard" determines one's station in society. Mr. Aloes from Pill Castle, who has made a fortune out of his knowledge of human nature and drives a limousine, is much more likely to be chosen for a senator than Dr. Stork who scarcely makes a living out of his knowledge of medicine and drives a Ford roadster. The day is past when the doctor is respected because of his profession alone, and most of us are guilty of valuing our practices by our cash receipts for the year. Therefore to be consistent we should welcome a method of converting this loss to a gain.

It is obvious that there is something missing in our present day civilization and that society will not be satisfied until the services of the medical profession are at the disposal of rich and poor alike. The National Insurance Act of Great Britain was designed to fit in between the medical profession and the public, but is a good example of how any problem will be solved by commencing at the wrong end.

Can we as a profession do any thing to prevent the copying of such an act in this country? If we can there is no time like the present. A National Medical Service has been suggested by some as the best solution. I can only see two objections to this myself; first, so many things now under government control are not managed with a degree of fairness that would tempt us to place our professional destinies in the hands of politicians, and secondly, the change from our present status is too great. Reforms come slowly, and to be at all permanent must be introduced step by step.

We are living in a commercial age and, I believe, the solution to this problem will be arrived at by studying commercial methods. The business way of insuring one's loss of property through fire is through fire insurance, and the business way of insuring one's loss through sickness is by health insurance. By analyzing insurance methods we can arrive at a solution that will be satisfactory to both public and profession. By accepting the good points of present insurance methods and supplying what is lacking to make it acceptable to the medical profession, we can arrive at a scheme that would guarantee the insured public medical, surgical, and hospital attendance, and guarantee the medical profession their fees. Any scheme of insurance which will include the

following four points should be acceptable to both public and profession:

1. The services of the whole of the medical profession should be at the disposal of the whole public.
2. No one should be made the object of charity.
3. The average medical income should be increased.
4. The basis of reckoning from which the actuary obtains his rate of insurance to the public should be the medical schedule of fees.

This should sufficiently protect the medical practitioner and should be sufficient guarantee to the public. Any insurance scheme which has for its object the securing of medical attention for the masses depends for its successful working on the judgement of medical men, and therefore should remain under medical control. If the scheme depends on our judgement for its successful working, we should be rewarded.

This is perhaps the largest problem that the younger generation of medical men will have to solve in their day and generation. It is worth every man's while studying. As I am not through studying it myself, I would be glad if those interested in the subject would communicate with me. And I shall try to make their questions and objections the subject of a second paper at some future date.

Edmonton.

A. R. MUNROE

LAST month the Quebec Municipal Board of Hygiene and Statistics commenced the publication of a sanitary bulletin. The bulletin, which will be issued monthly, will contain information concerning public health, the prevention of disease, and recent discoveries in matters pertaining to hygiene and health. Important articles will appear both in English and French, others being in either one language according to the source of the information.

Obituary

DR. F. L. DE VERTEUIL, R.N.R., of Vancouver, lost his life on the *Good Hope*, which was lost on Sunday, November 1st, in the naval action off the coast of Chile. Dr. de Verteuil was the son of Dr. J. de Verteuil, surgeon major in the British army. He was born in Trinidad in 1879 and received his medical education at Edinburgh and Paris. Dr. de Verteuil was particularly interested in the study of radium therapy and had written several important papers on the subject. He had been in practice in Vancouver for two years and a half. A few months ago he went to the West Indies in order to study the curative effects of radium in leprosy; while there he was ordered to join the *Good Hope* in the capacity of surgeon. Dr. de Verteuil leaves a widow and two children.

DR. JAMES GRAEME ROBERTSON died at the Winnipeg General Hospital on November 3rd. Dr. Robertson, who was in the twenty-ninth year of his age, was born in Brussels, Ontario. Seven years ago he went to Winnipeg and soon afterwards entered the Manitoba Medical College from which he graduated in 1911.

DR. MACKLIN, of Bresler, Saskatchewan, died early in October. About twenty-five years ago Dr. Macklin was well-known throughout the West as physician in connexion with construction of the Canadian Pacific Railway.

DR. H. M. SHEPHARD, of Ingersoll, Ontario, died October 20th. Dr. Ingersoll, who was twenty-seven years of age, had been in practice at Ingersoll since April.

DR. R. J. LOCKHARD, of Hespeler, Ontario, died in British Columbia, where he went some years ago to try to regain health.

DR. BRADFORD PATTERSON, of Barrie, Ontario, died November 6th, in the ninety-fifth year of his age. Dr. Patterson had practised in Markham, Collingwood, and Newmarket. He was one of the oldest freemasons in Canada. During the American Civil War he served as surgeon in the Northern army.

DR. HENRY REID McCULLOUGH, of Harrison, Ontario, died October 21st. Dr. McCullough was born on August 14th, 1863: he was the son of the late Dr. Robert McCullough, of Georgetown. After graduating from Trinity Medical College, Toronto, Dr. McCullough went to London and Edinburgh and in 1883 took up practice at Harriston. He leaves a widow and four daughters.

DR. JAMES LESLIE, of Hamilton, Ontario, died October 18th. Dr. Leslie was born in New Pitsligo, Aberdeenshire, Scotland, on September 23rd, 1832. He was educated in Aberdeen and graduated in medicine from the university there. Later he obtained the degree of L.R.C.S. from the University of Edinburgh. Dr. Leslie spent some time as surgeon on vessels in the Arctic regions, subsequently going into practice at New Deer, Aberdeenshire. In 1872 he came to Canada and commenced to practise in Hamilton where he spent the last thirty years of his life. Dr. Leslie was much esteemed and as a surgeon was held in high repute. His son, Dr. Norman V. Leslie, is now with the Canadian Expeditionary Force in England.

DR. E. CAMERON died at Elyria, Ohio, October 8th. Dr. Cameron was born at Albany, Prince Edward Island, and was in the sixty-eighth year of his age. After graduating from Bowdoin College, Dr. Cameron practised for some years on Grand Manan Island, New Brunswick. In 1894 he went into business at Lorain, Ohio, and two years ago was appointed coroner of Lorain county.

News

MANITOBA

It is probable that application will be made to the provincial government in order that more complete regulations may be made concerning the control of tuberculosis in the city of Winnipeg. The King Edward Hospital contains accommodation for seventy-two patients but this is not sufficient for Winnipeg alone and provision must be made for the outside municipalities. Under the present conditions the city has no right to collect fees from such

municipalities for outside patients who are treated in the hospital, nor does the hospital receive any government grant.

A FIRE occurred at the Elgin Street Convalescent Home in the early morning of October 20th. The patients, sixteen in number, were able to escape but the building was badly damaged.

ONTARIO

AFTER a careful investigation of prevailing conditions it has been decided that the slaughter houses of the province shall be brought under the direct regulation and inspection of the provincial board of health. In future the plans and specifications for buildings intended to be used as slaughter houses must be approved by the provincial board. Proper drains, lighting and ventilation will be required and employers will be held responsible for the cleanliness of their employees. No workman affected with a communicable disease may be employed in any department in which meat is handled or dressed. The sale of meat unfit for food is to be made an indictable offence.

DR. S. L. McLAY, of Woodstock, has joined the Royal Army Medical Corps. Dr. McLay went to England some weeks ago to take a hospital course there.

MR. JAMES MANUEL has been elected president of the board of directors of the Ottawa Protestant General Hospital in succession to Lieutenant-colonel J. W. Woods.

TYPHOID fever is reported to be prevalent in Hamilton and Sudbury. In the former place the infection is thought to be due to the milk supply. There are also a good many cases of diphtheria and chicken-pox in Hamilton, and of diphtheria in Berlin.

AN epidemic of measles of a malignant form is reported from certain municipalities near Stratford. A number of deaths have occurred.

A MEETING of the Lambton County Medical Society was held in the officers' quarters of the Watford Armory, October 14th. An excellent paper was given by Dr. W. J. Stevenson, of London, Ontario.

DR. T. A. MALLOCH, of Hamilton, has left for service at the front.

THE Toronto Children's Hospital has been enlarged by the addition of a new wing which gives accommodation for fifty-two more patients and which will be used for detention purposes. An out-patient's department, a power plant and laundry and a new pasteurizing building and plant have also been added. During the last hospital year 31,970 patients were treated in the various departments of the hospital.

QUEBEC

AN outbreak of typhoid fever is reported from Aylmer. Early in November it was stated that more than one hundred cases had occurred. The town of Aylmer is situated on the banks of the Ottawa river, from which its water supply is obtained and the infection is thought to be due to contamination of the water.

DR. JAMES MCGREGOR has been appointed surgeon with the European contingent on the American Ambulance staff. Dr. McGregor practised in Megantic for some time and recently has been connected with the Presbyterian Hospital at New York.

DR. JAMES C. LEE, of Quebec, who recently was appointed house surgeon of the Montreal General Hospital, has joined the Royal Army Medical Corps in England.

DR. C. J. EDGAR, of North Hatley, has been appointed surgeon in the military hospital at Netley.

THE formal opening of the new St. Justine Hospital for Children, Montreal, took place on Sunday, November 8th. The new hospital contains one hundred and eighty beds.

ALBERTA

AN epidemic of typhoid fever is reported from Coal City, a coal camp three miles from Taber, near Lethbridge. Over twenty cases have occurred and one death has been reported.

DR. C. S. MAHOOD, medical health officer of Calgary, has been elected a Fellow of the Royal Institute of Public Health, London.

SASKATCHEWAN

DR. ANDREW CROLL, of Saskatoon, has been elected a Fellow of the American College of Surgeons.

MEDICAL COLLEGES

Alberta University.

THE autumn examinations for licence to practise in the province of Alberta were held at the University of Alberta, commencing on September 15th. The following is the list of successful candidates: W. W. Cross, C. T. Galbraith, F. R. Gray, T. W. Moore, H. C. Swartzlander, J. Thomson, J. H. E. Hastings. The following have been granted supplementals: W. E. Fraser, in anatomy and physiology; E. A. Ferguson, in anatomy and physiology; D. R. Wark, in pathology and medicine; S. Astrof, in pathology and surgery.

ON SALISBURY PLAIN

THE following are extracts of letters received recently from officers of the Canadian Army Medical Corps.

"No. 1 General Hospital, Salisbury Plain, November 1st, 1914. We are all under canvas on this vast plain, and about three miles from a couple of small villages. The hospitals and field ambulances are all together on a hill, with tent doors facing the north east. . . . It looks to me that No. 1 will stay here for some time. I have forty or fifty cases with five assistants, all very competent men. The experience is useful in learning the routine of a military hospital.

"We have had several cases of epidemic meningitis. I am trying to get serum, which I believe was ordered but left in Quebec. Most of the cases are muscular rheumatism, influenza and bronchitis. . . .

"General Alderson has made a very good impression and has impressed upon the commissioned officers that discipline is essential before the troops can be sent to the front. We hear that Kitchener and the Staff in France have no doubt about the issue of the war. The men sent to the front are being well trained, and as you can read in the scanty reports are much more than holding their own. . . .

"We are well fed by Harrods at 1/- daily, the government paying 5/6. If we are extravagant on 3d. cigars, we can manage to spend about 4/- daily. To get anywhere, however, is costly. We are badly in need of a motor but hope to have one shortly."

"No. 1 General Hospital, Salisbury Plains, November 5th, 1914. As you see we are still in England, on the most wonderful training ground I ever saw. Miles upon miles of what looks exactly like prairie land, long deep undulating ground, with innumerable shallow little valleys, looking like nothing so much as a deep rolling ground-swell on the Atlantic, the celebrated downs of Wiltshire, noted for its sheep. Here, at intervals of three or four miles, the Canadian Contingent is quartered, foot, horse, and artillery. Dr. MacLaren, of St. John, N.B., is in charge of No. 1 General; and Cameron and Finley in charge of surgery and medicine; Forbes, orthopedist; Johnson, of Vancouver, assistant surgeon; Ellis, formerly of the Rockefeller Institute, biologist and pathologist; Lomer, of Ottawa, sanitary officer; Hunt, of Port Arthur, nose, throat, eye and ear; Campbell, genito-urinary (and a most busy man! Seven tents of G.U. cases); Vaux, of Winnipeg, registrar and adjutant; Wylde, assistant in medicine; Corbet, of St. John, has been detailed in medicine; while I, not having any *x-ray* apparatus (not delivered yet) am wasting my fragrance in the desert air of two medical tents; and 'desert air' is no figure of speech either, for there is air, plenty of it, with a *vis a tergo* truly startling, accompanied almost every night and sometimes all day with a drenching rain. Our tents are not as good stuff as the Canadian ones—more accommodating to the ingress of rain—but we have hospital beds, lots of blankets, a portable bath, coal-oil heater, oil lamps, tables, chairs, etc., and a fairly decent mess, to which we daily wade half a mile through ankle-deep mud, hence the regulation dress of the oldest riding breeches, and the newest rubber knee boots.

"Yesterday we were inspected by the King, Queen, Lord Roberts, Earl Kitchener and staff. The King looks much older, and good old Bobs carries his eighty-two years like a spring colt. Kitchener is taller, stouter, and whiter than I had pictured him. But Bobs was Bobs, the idol of the Englishman's heart, and it is indeed hard to control the tightening cords as the old warhorse goes by, leaning just the barest trifle on his cane, and, judging by the expressions of the men—more forceful than polite—there were few who would not emulate the followers of the lieutenant who took 'Lungtungpen,' if only Bobs Bahadur were leading them. . . .

"We are moving from here in a couple of days to Bulford, near Amesbury, about five miles away, where I believe they have secured Bulford Manor, and where we are to open a small general hospital, while No. 2 Stationary, under Shillington, of Ottawa, goes to France

this week, and No. 2, under Bridges, goes, I believe, to London or Portsmouth. . . ."

A DESPATCH from Salisbury to the *Toronto Globe*, dated November 22nd, stated that the following officers of No. 2 General Hospital, of which Lieut.-Colonel Bridges is in command, were leaving the next day for France: Lieut.-Colonels Scott and Rudolf, Major Goldsmith, Captains Cole, Menzies, Calhoun, Philp, and McBeth, of Toronto; Captains Bethune and Leslie, of Hamilton; Captains Tytler, of Guelph, and McKee, of Montreal; Major Gardner and Captains Dillon and McLeod, of Ottawa.

Canadian Literature

ORIGINAL CONTRIBUTIONS

The Canadian Practitioner and Review, November, 1914:

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| Presidential address—Academy of Medicine, Toronto | H. B. Anderson. |
| The Jarish Herxheimer reaction | H. M. Benoit Simon. |

Dominion Medical Monthly, November, 1914:

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| Legislation concerning the right to practise medicine | A. F. McKenzie. |
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The Western Medical News, November, 1914:

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| Mixed infection—diphtheria and scarlet fever | J. A. Rose. |
| Essential hæmaturia | F. A. Corbett. |

The Western Medical News, October, 1914:

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| Technique of skin-grafting following burns | C. M. Henry. |
| Ectopic gestation | H. E. Alexander. |
| A case of chronic intestinal obstruction, due to chronic appendicitis, with adhesions, and terminating in an acute attack with operation | H. H. Mitchell. |

Western Canada Medical Journal, September, 1914:

- Ectopic gestation A. P. Mackinnon.
 A review of the advent and clinical application of different biologic products M. R. Blake.

The Canada Lancet, October, 1914:

- The diagnosis and treatment of acute perforations of the stomach and duodenum S. M. Hay.

The Canada Lancet, September, 1914:

- Chronic dacryocystitis: the intranasal operation, with case report . . . J. McGillivray.

The Public Health Journal, November, 1914:

- Municipal loans and municipal works R. O. Wynne-Roberts.
 Pasteurization of milk L. C. Bulmer.
 The examinations of a recruit W. A. Scott.
 Municipal abattoirs R. O. Wynne-Roberts.
 Food inspection among the foreign population G. R. Mines.

 HURON MEDICAL ASSOCIATION

A MEETING of the Huron Medical Association took place in the council chamber at Goderich on Wednesday, September 16th. There was a good attendance and some interesting papers were read. It was decided that members of the association should give their services without remuneration to the families of privates who have volunteered for military service during the present war.

CANADIAN MEDICAL ASSOCIATION

PUBLIC HEALTH SECTION

Report of the Committee on Applied Sociology

THE Committee in attempting to formulate its report on Applied Sociology recognizes the two standpoints from which the subject may be viewed, viz., that of society and that of the individual and especially of the individual physician. It observes further that as sociology refers to individuals in the mass, so the various matters dealt with in such a report must apply especially to the association of individuals as members of communities. Critical observers of the great world movements have everywhere been noting, especially with the twentieth century, the evolution of what is called a social consciousness in the western world, which for a century had been especially dominated by the theories most elaborately taught by John Stuart Mill in his political economy in which individualistic competition was set forth as the real basis upon which a progressive society could exist. Plainly, however, there is a higher ideal, and that is that the members of society should exist for the good of one another. In public health such a theory had its genesis largely in Edwin Chadwick, the slum worker, who was instrumental in getting the Registration Act for births, marriages, and deaths of England placed on the Statute Book in 1838 and later the first Public Health Act in 1849. With these two agencies it became possible, through the facts obtained, to apply remedies under Acts relating to nuisances, to housing, to pollution of streams, to contagious diseases and so on. But not until Pasteur and other workers established the germ theory of disease did it become possible to formulate methods for attacking disease systematically, whether in the individual or in the group. The first comprehensive means to this end is to be found in the Consolidated Public Health Act of England of 1875 which summarizes much found in previous isolated Acts. Nine years later this formed the basis of the Public Health Act of Ontario, which again was the model upon which all provincial legislation in Canada has been founded. Year by year thereafter amendments to the Act were added dealing with many problems, each coming closer in its bearing upon the daily life of the people. Speaking of anti-

tuberculosis work Dr. Hermann Biggs, general medical officer of New York, has said:

"Step by step with the growth of our knowledge of the causes of the disease, the scope of the work has broadened, first one, then another agency was enlisted in the campaign, and we are striking nearer and nearer to the essential cause of the prevalence of the disease, namely the social environment."

The bearing of these facts upon the work of the practising physician is apparent, and he too has been as greatly aided as directed in his benevolent work in the cause of humanity. Its extent, its possibilities, and the nobility of it have been made ever more apparent to him, and to-day he enters ever more largely into the life of the community of which he is so important a member and constantly is asked to perform some public function as a duty which is complied with as a privilege.

In the matter of the compulsory notification of contagious diseases, it is interesting to note the gradual extension of legislation beyond what formerly included only smallpox, scarlatina, diphtheria and measles, to all acute contagions; since to-day the whole range of diseases in any way communicable are one after the other coming within the purview of what we call preventive, but what is more exactly termed state medicine.

From such facts as that Bismarck's Compulsory Insurance Act was passed in Germany in 1882 and that in 1912 even a wider Act of the same sort was passed in Great Britain including within its provisions 15,000,000 people, it has become evident that the needs of modern society in the matter of the health of its individual citizens are to be the only limitations set to what the legalized functions and social duties of the practitioner of medicine shall be.

Your Committee, however, desires rather to present the second phase of the subject, viz., that dealing with the *ethical* responsibilities of every disciple of the Father of Medicine, who has taken in spirit, if not in so many words, the Hippocratic oath. While it is true that the physician ought to maintain a proper secrecy with regard to the ailments of the individual patient, so far as no injury to the public may result therefrom, yet in view of our ever widening knowledge of disease it seems plain that from the position the physician is constantly placed in because of his very knowledge he can no longer, and would not indeed, avoid the issue of what his duty as a good citizen and patriot demands of him.

Some of the questions which the practitioner of to-day has pressed upon him are such as the following:

Compulsory Notification of Tuberculosis

It is just twenty years since this matter was first pressed upon the Government of Ontario by the Provincial Board of Health. The then premier listened sympathetically, but asked: "What, for instance, are you going to do with the sick persons whom you will have practically forced out of boarding houses and hotels?" It was in the same year 1894 that Dr. Hermann Biggs, under the New York Board of Health, instituted the practice of the examination of the sputum in all cases coming within the knowledge of the Board, and it was in 1897 that notification of tuberculosis was there made compulsory. In 1894 only 511 specimens of sputum were examined and in 1911 there were 41,820. The logical sequence of notification was the disinfection of premises vacated by death or removal and the disinfection periodically of infected houses. As tuberculosis is so chronic and thus may be a source of infection to many, it further soon followed that supervision of cases in the houses and the education of both patient and members of his family became obviously necessary. So district trained nurses under the Board of Health or the Antituberculosis League were appointed as the next step. Such measures were, however, elementary in the same manner as treating acute contagions in their homes formerly existed when compulsory notification first began. It soon became apparent that to deal effectively with the many families where tuberculosis had induced privation or poverty, various institutions became necessary both for the care of the sick and for the protection of their families and associates. Logically the first step was the clinic to which any person wishing free examination and attention could go or be sent by social workers, clergymen, etc. Thus arose what is called the Tuberculosis Clinic, now operative in every progressive city, New York having twenty-nine such clinics, while Glasgow has six. Such being directly associated, as they ought to be, with the local board of health and the charity departments of a city, become clearing houses for the disposition of cases in the manner most suited to their individual condition and needs.

Such divisions of work in their natural order, as given by Dr. H. Biggs, are:

1. Sanatoria for early and curable cases.
2. Hospitals for advanced cases.

3. A detention hospital for compulsory handling of undesirable patients from these institutions, or from charitable or corrective institutions, or from their homes where poverty or insanitary surroundings require that patients be compulsorily removed.

4. Open air camps—as day camps, roof gardens and tents.

5. Hospitals, especially marine or lakeside hospitals, for diseases of bones, joints and glands in children.

6. The preventorium for children.

7. The day nursery for the care of children of tuberculous families.

8. Open air schools.

9. Home treatment of tuberculous families.

10. A colony farm to give occupation to persons having recovered so as to be able to work.

Such is as admirable an illustration of applied sociology as can anywhere be found; but Dr. Biggs, after referring to the fact of New York's density of population—600 to 1,600 per acre, exceeding that of London which is not more than 400, makes the notable statement: "The whole problem of the prevention of tuberculosis is inextricably interwoven with various economic features in the lives of the working classes, but this applies to a much larger extent to the inhabitants of the great cities than elsewhere. It cannot be wholly solved until the questions relating to sanitary housing and the general welfare of the poorest classes have been satisfactorily answered."

We have presented this rather full outline, since nowhere has there been seen so extended and systematized an illustration of applied sociology based upon the data gained by compulsory notification and complete death returns as in New York, and nowhere have results been more striking, since the returns for 1911 in the boroughs of Manhattan and the Bronx show the following:

	Population	Total deaths Per 1,000	Deaths from tuberculosis per 1,000	Per centage of tubercu- losis deaths	Total noti- fications
1881.....	1,244,511	31.04	4.92	15.85
1894.....	1,809,353	22.70	3.16	13.89	4,166
1911.....	2,872,428	15.78	2.35	14.90	51,211

The total tuberculosis deaths in 1911 were 6,760 and the reported cases for the year, not including duplicates, were 17,360, so that the notified cases, even excluding duplicates carried over from

a preceding year, were 257 for every 100 deaths. That the principle of compulsory notification has grown gradually, and only as a part of applied sociological methods, as seen in New York, may be judged from the fact that it was made compulsory in England and Scotland only in 1910. That its completeness, even in a country where compulsory methods are proverbially well enforced, varies greatly is seen in the following table:

RATIO OF NOTIFICATIONS TO DEATHS FROM TUBERCULOSIS (PHTHISIS) FOR THE YEARS 1910-12.

	Death rate per 1,000	Total Notifications	Proportion of cases to 100 deaths
Birmingham.....	1.28	4,394	404
Liverpool.....	1.49	3,690	329
Manchester.....	1.53	2,398	216
Bradford.....	1.26	921	253
Portsmouth.....	1.13	1,267	475
Sheffield.....	1.22	980	173
Edinburgh.....	1.26	1,255	309
Glasgow.....	1.32	2,330	225

A careful analysis by Dr. A. S. McGregor, tuberculosis officer for Glasgow, of these figures, and especially of the ratio of notification by age periods, indicates very different proportions in the degree that certain kinds of health and social work are carried on. For instance, the ratio of school-children notified has always been found high where systematic medical inspection of schools is carried out, or where a tuberculosis dispensary is actively carried on, as in Edinburgh where notified cases rose from 448 to 1,221 from 1910 to 1911 owing to a critical and extended home examination of the relatives of consumptive patients coming to the Royal Victoria Dispensary. Remarking upon such variations, Dr. McGregor speaks of the marked differences in notification, depending upon the variations in interpreting physical signs by different physicians who deal especially with tuberculosis, and states that it is apparent that some special officer, such as the superintendent of a tuberculosis sanatorium, must be given the opportunity to follow up notified dispensary or other cases. For instance, Glasgow has six tuberculosis dispensaries, and the special tuberculosis officer with his sanitary visitors watches over suspected cases, which are treated for catarrhs, anæmias, etc., and tested with tuberculin when deemed necessary. During the years 1910-14 in Glasgow

all notified cases were followed up, and it was found at the end of the period that of 3,425 notified cases, 1,775 had died in the four years, or 54 per cent. Speaking of 493 or 14·2 per cent. of the cases which could not be found, Dr. McGregor remarks that the operation of the Compulsory Insurance Act with better organization will largely eliminate these difficulties. Dr. McGregor points out the enormous advantage to be gained from observation of notified school children, since it confirms the general experience of the existence of a very chronic and easily arrested type, that of tuberculosis of the lungs in children. When it is remembered that so many of such cases follow measles and whooping cough, it is obvious that the medical health officer cannot in practice limit the extent to which his relations with physicians in charge of such cases should extend. What is of further interest is the evidence from the statistics of cases alive, over fifteen years of age, that at the end of four years 67·5 per cent. were considered definitely tubercular and nearly 10 per cent. more definitely well, while the balance, about 20 per cent., had bronchitis, asthma, etc. Of extreme interest in Dr. McGregor's study of cases were those where subsequent cases had been notified. Thus, 130 cases in 1910 were followed by 150 secondary notifications within three years, or 74 in 1911, 51 in 1912 and 25 in 1914. Over all, the figures show that in three years 411 notifications were made respecting members of houses previously reported as having had 375 primary cases.

We have dealt thus fully with both the statistics of New York and Glasgow because these present two of the best illustrations of science applied to social and public health problems, which are indeed one; while the work done and the means applied in both cities for studying and dealing with tuberculosis are in keeping with what is almost axiomatic, that "the degree of prevalence of tuberculosis in a peculiar degree becomes the gauge of individual or communal effectiveness, measured from the physical, ethical or economic standpoint." The same truth is expressed in another way in an address by the Hon. James Bryce at a Housing Conference in New York on "The Menace of Great Cities," when he said, "Whatever you are trying to accomplish for the benefit of the poorer classes leads you, by one path and another, to the housing problems. The place where a man or woman lives is vital to the character of the man or woman."

From the illustrations given your Committee turns to Canada for similar evidences of applied sociology. In 1900 the Canadian Association for the Prevention of Tuberculosis was organized and

in the same year the first Sanatorium Act was passed in Ontario. The success of the educational work, both national and provincial, has in recent years become more marked, as is witnessed by sanatoria being established in all the provinces, whether developed by government or by large grants-in-aid to municipalities or districts. As an illustration of a splendid advance in applied sociology with a highly evolved social consciousness, your Committee finds in the work of the city of Hamilton as admirable an example as almost any elsewhere and deems it appropriate to refer to it.

The seventh annual report in 1912 of the Hamilton Health Association states that with a population of 50,000 the tuberculosis deaths were 87, and in 1912 with a population of 80,000 the total was 64, or 7.5 per cent. and 5.3 per cent., respectively, of the total death rate. With the collective days at the sanatorium being 19,781 the expenditures were \$18,556.15, or 0.94 per diem, the lowest cost of any similar institution in Canada. When the Sanatorium began, the admissions were as follows: In 1906, 71; 1910-11, 139; 1911-12, 109; and 65 were in residence at the time of the report being made. It is of great interest to compare this with Ottawa where the provision of a hospital for advanced cases and now a sanatorium for early cases exists. The report of Ottawa for 1912 states:

Patients admitted 1912-13.....	118
Patients died in hospital in 1913.....	39
Hospital patients who died outside.....	2
Total deaths in city.....	130
Population.....	100,000

At the Hamilton dispensary the number of persons examined in 1912 was 718, of whom 76 were children. There were 2,032 visits to the dispensary, an increase of 1,268 over 1911. Visits to the homes of patients numbered 1,212. At the Ottawa dispensary the number examined in 1912 was 137, of whom 32 were children, an increase of 52 over 1911; and there were 905 visits to the dispensary. The cost per diem per capita in Ottawa at the Sanatorium was \$1.10. We find in each of these cities, as in most other progressive centres, the several means of applied social work well illustrated, namely (1) the sanatorium for early cases, (2) the hospital for advanced cases, (3) the home for far advanced cases, (4) the dispensary, (5) the visiting nurse, and (6) the ladies' auxiliary. Hamilton has in addition its preventorium, or open-air school. The work done in both these cities which are so comparable illustrates

well a remark by Viscount Bryce in the paper already quoted, "But, when everything that the state can do has been done, there will remain a large field in which the action of private men and women will be more helpful than the action of the state can be, because it will be better adapted to the needs and conditions of the people whom it is intended to help, because it will be more flexible, more personal, more human, more animated by that spirit of helping the weak which is the essence of every effort to raise them."

In another quarter I find illustrated applied sociology in a recent review in the *New York Sun* of the life of that remarkable social reformer, the late Jacob Riis, a newspaper reporter and native of Denmark. His work led him everywhere into the slums and he greatly stimulated and aided Theodore Roosevelt when Police Commissioner of New York:

"Mr. Riis did the work that won small parks for bad spots in in the city. He laboured years to have more schoolhouses built. The evils he exposed he discovered in his work as a reporter. He knew how to write so as to wring men's hearts with his news of oppression, misery, and hopelessness. He compelled indifferent city officials to concede the reforms he suggested or approval. It was Riis who exposed the contaminated state of the city's water-supply, and thus brought about the purchase of the whole Croton watershed. It was Riis who forced the destruction of rear tenements, and thus relieved the hideous darkness and density of life among the very poor. He forced the obliteration of Mulberry Bend, the worst tenement block in the city, and had the space turned into a park. He spoke the word that induced Commissioner Roosevelt to abolish the police lodging-houses. He fought for and secured a truant school. He drove bakeshops out of tenement basements. He demanded light for dark tenements, thus illuminating the hiding-places of dirt, filth and crime."

Before passing on to another phase of the report your Committee would refer to the status of compulsory notification of tuberculosis as the measure of administrative effectiveness in public health departments. Dr. Herman Biggs, from 1892 onwards the general medical officer of New York and now chief medical officer of New York State, introduced, after much discussion in medical societies, compulsory notification of tuberculosis. Speaking of it in a paper in August 1913, he says:

"Of the various features of the antituberculosis work, none is more fundamentally important than notification and registration

of cases; and none has been more misunderstood or opposed by the medical profession. In spite of almost innumerable objections at first urged, it has finally been realized that no adequate control of tuberculosis can be effected without such notification and the objectors one by one have been silenced. . . . Certain it is that not one of the disastrous consequences urged against notification has materialized and in New York City such notification has now been in force for almost twenty years."

The Quebec Public Health Act 1909 states that every householder and physician is obliged to notify tuberculosis, as other diseases, and is liable to a fine of \$20.00 for each day he neglects it, yet I find the Report of the Royal Commission 1909-10 stating: "The Commissioners are not unaware that there is a law in our Province ordaining that physicians declare all cases of tuberculosis to the health authorities, but they have ascertained that the law remains a dead letter." The Public Health Act of Ontario of 1912 makes the notification of tuberculosis compulsory, yet it is found that the deaths in Ottawa in 1913 were 136 while the cases notified, mostly through public institutions, were only 108. It is probable that these two instances illustrate the situation in most Canadian cities; although in the instance of Hamilton there were in 1911 only 64 deaths from tuberculosis and 83 notified, while with rather fewer cases in the sanatorium there were 150 cases notified, whether directly through physicians or through the institutions in 1912.

The Quebec Commission report says: "In order to combat a disease it is necessary to know where it exists." Dr. Biggs speaking of house visitation, which of course is conditioned by *notification*, says: "And just as tuberculosis has been found to be, in the final analysis, not a mere bacterial invasion but a symptom of social pathology, so it is gradually being realized that many other diseases affecting mankind have a social pathology." The possibility of notification has depended upon the public sentiment which has assisted in erecting hospitals and sanatoria, and the fact that every province has local and provincial sanatoria and hospitals for advanced cases, either special or general, points to the logical gradual increase in notification, wherever a medical officer receives the support of the social workers of his municipality.

As an adjunct illustrative of applied social work, the education of the people by moving pictures supplied by the boards of health has come to be of great value, being often associated with tuberculosis exhibits.

Child Hygiene and Inspection of Schools

The ways by which modern scientific knowledge is being applied to social needs are so many that time fails to present such in all their aspects; but in nothing has the social conscience been more aroused than in the care of the children. Every progressive city has recognized that, through trained district nurses either under the direction of the board of health or some social service committee whether of hospitals or charitable organizations, what may be called first aid is given by nurses' visits to the homes of the poor when infants are born, this being the first step to be taken to save the babies. This work has in recent years been greatly supplemented by the milk stations, similarly under trained nurses, where the women come with their sick children and after medical examination are supplied with certified milk and taught how to care for the baby and its food. It is in these ways that accurate knowledge is being daily gained of the actual conditions in the homes of the poorer people and through which organized methods may be adopted for dealing with other problems as sanitary houses, overcrowding and contagious diseases. But at five or six years of age one seventh of the total population, the school children, pass under the direct supervision of the State. Here we see the beginning of public supervision by the State and the test of public progress and social efficiency applied at once. For instance in a series of Indian children awaiting admission to some boarding school in Alberta, not one was examined who did not show signs of initial tuberculosis; but we need not go farther than the reports of school nurses in any of our city schools to show the need of adding to the supervision of the teacher, exact trained medical knowledge. Speaking of a Toronto suburban area the school nurse thus describes the situation:

"The population until recently was made up of new comers from the British Isles: the majority being English. These families occupied tar paper shacks of from one to three or four rooms. In many cases a house twenty feet square, divided or curtained off into living room and bed-room was the home of six or eight persons. Fathers came out from the old land, purchased a small piece of ground, erected a shack."

Through the kindness of Dr. Bentley, of Sarnia, the district medical officer for south-western Ontario, I have been enabled to supply the actual results of a medical inspection carried out by himself and the local medical health officers. It was found that over 60 per cent. had some physical defect demanding skilled

attention, of which defects of vision and the teeth were the most numerous. It is thus, as Dr. Bentley illustrates, that the wide range of sanitary influences becomes educative and the child becomes the medium through which light and leading enter the home as well as through which trustees become informed and cognizant of their duties. This application of sociology is of the widest character and, like the work done with regard to tuberculosis, can be pushed to limits measured only by the degree to which medical officers, inspectors, teachers and school trustees recognize the extent of work to be done and appreciate the social responsibilities resting upon them. Dr. Bentley writes as follows:

"In the months of October and November, 1913, I inspected all the school children and the High School students in Parkhill, Lucan and Ailsa Craig as well as those in 17 country schools. The defects noted were: defective vision, defective nasal breathing, enlarged tonsils, carious teeth. Total number of inspected, 821; of defective, 432; of defects, 659. After these inspections had been completed the school nurse made visits to 191 homes. In March and April of this year I inspected the school children in Forest and Thedford, as well as those in 11 country schools. The total number of those inspected was 571; of defective, 347; of defects, 512.

The school nurse made visits to 162 homes and found many of the children already under treatment. Of 38 children in one room in Forest we found 19 with defective vision, and of 50 children in another school in Thedford 21 had defective vision. In both cases we found that these children had been allowed to attend classes for a year and over in poorly lighted buildings, while new schools were under construction. As an indication of the importance of inspections being made, I give you here a report which applies to the one recently made: impaired vision, 104; carious teeth, 207; defective nasal breathing, 69; enlarged glands, 19; anæmia, 37; ringworm, 1; pediculosis, 12; total 512 in 821 inspected."

Control of the Social Evil

This problem will doubtless be dealt with by the special committee; but no report on applied sociology would to-day be considered complete without reference to it. It is impossible to separate from the complex factors which enter into the problem any single one as being that to be specially attacked; but in every direction to-day the clinic, psychopathology, and heredity are being ex-

exploited in endeavours to determine what is the true direction in which social work can best cope with this evil. There are, however, several elementary facts which serve to guide society in its more simple efforts, as when it is stated that if alcoholism is associated with 25 or 35 per cent. of cases of venereal disease, the plain fact must exist that under the influence of intoxicants many first cases have become infected. Hence society to-day is concentrating its efforts as never before on curbing the national vice of alcoholism, basing its arguments on physical, mental, moral, industrial and national grounds. Where the old argument is used that only the hereditary degenerate gets drunk, and that the ordinary use of alcohol by the normal man in society is harmless we only pity the superficiality of the observer or question either his good faith or his intelligence. When we are taught by most extended statistics, as those of Dr. Mott of London, that practically all paretics and tabetics are syphilitics, that 40 to 50 per cent. of the children of such are feeble-minded and show the spirochætes in their blood, and that many of these were alcoholics, we are again met by the argument that it is inevitable. When we learn that 80 per cent. of the children in the juvenile courts of New York, or 10,000 in a single year, were feeble-minded, and that some 50 per cent. of the young women sent to reformatories are feeble-minded, we hear the statement that such is inevitable, and from many quarters are met with the old chestnut: "What is the use of talking about these things, drunkenness, vice and feeble-mindedness even to insanity, all have been and will be. Better leave well enough alone." It is indeed like a fresh breeze from the Laurentians blowing over thousands of miles of ever-green forest, uncontaminated by the presence of humanity, to find a man like Dr. Herman Biggs, for a quarter of a century general medical officer of a city like New York, taking for his motto everywhere: "Public Health is purchasable: within natural limitations a community can determine its own death rate." Where women are demanding, with fury even, the vote to devote it to social ends, where Scotland possesses a general Act preventing drinking places from opening till 10 a.m. and where the leader of a political party in Canada's most important province makes "Abolish the Bar" his battle cry, it is quite clear that social forces taught by statistics, by physiology, by economics and above all by the cost of vice and its logical consequences in individual, social and natural enfeeblement, and where especially the cry is going up from the diseased, the feeble-minded, insane, and neurotics, all of

whom bear the stigmata of hereditary or induced defects, physical, mental and moral, it is abundantly apparent that a social consciousness has become developed which must find expression in common action through means both individual and collective, whereby society as a whole will be uplifted, and humanity find, as the Hindoo poet, Dr. Tagore, teaches, the realization of life in action:

The gods addressed the mighty Vishnu thus,
"Conquered in battle by the evil demons,
We fly to thee for succour, Soul of all:
Pity, and by thy might deliver us."
Heri, the lord, creator of the world,
Thus by the gods implored, all graciously
Replied: "Your strength shall be restored, ye gods
Only accomplish what I do command."

July, 1914.

P. H. BRYCE, M.D.,
Chairman.

Medical Societies

MONTREAL MEDICO-CHIRURGICAL SOCIETY

THE sixteenth regular meeting of the Society was held Friday evening, May 15th, 1914, Dr. W. F. Hamilton in the Chair.

LIVING CASES: (1) Tuberculosis of the stomach, by Dr. A. E. Garrow.

Up to 1899 there were but thirty cases of this condition reported. The patient was a young man aged thirty years; comparatively good health until a year ago, when he began to complain of pain about an hour after eating, referred to epigastrium; severe pain extended across into both hypochondriac regions through the back; pain relieved by taking food, although somewhat aggravated after a meat diet. In January of this year pain much more severe, accompanied by vomiting and tenderness. Liquid diet gave marked improvement and gain in strength. On getting up and resuming ordinary diet, symptoms returned. Blood had been

found in the stools before admission. The case ran an afebrile course; no disease of chest; duodenal ulcer diagnosed. April 1st, opened abdomen: extensive miliary tubercles from pyloric up towards cardia, densely marked over antrum; no evidence of tuberculosis of the distal layer of the peritoneum or of the bowels or parietal layer of peritoneum. Glands of lesser curvature enlarged. No adhesions of omentum to stomach nor to parietal peritoneum. On attempting to lift up the pyloric antrum it was found that in the posterior wall, and extending well up to the pylorus shading off in an oblique fashion, was a dense hard mass two or two and a half inches in width and probably four inches in length, evidently attached to the pancreas. It was evident we were dealing with tuberculosis of the stomach and the mass was probably a large tuberculous ulcer. Giant cells and tubercle bacilli were found in the gland removed for examination. A gastro-duodenostomy was performed. The patient had a stormy convalescence for the first three days; on the second day had a chill and an exceedingly rapid pulse, some distension, and vomited once in the first twelve hours. Condition gradually improved and in three weeks was taking food well. Improved steadily and has gained fifteen pounds in weight. On Monday of the present week he vomited twice but since then has had no vomiting or distress. An x-ray plate taken yesterday by Dr. Pirie after a bismuth meal shows new trouble developing; evidently interference with outlet of food from cardia through the anastomosis and probably a giving way of the fascial band so that food is going on through the antrum and pylorus. Our theory now is that the patient may not be suffering from tuberculosis alone but from malignant disease as well; this has been noted in a number of the cases of tuberculosis of the stomach reported.

2. Vincent's angina, by Dr. L. J. Rhea. The boy is a patient of Dr. Chas. Vipond and is a typical case of this condition.

DISCUSSION: Dr. H. S. Birkett: This condition has been seen by me very frequently and this is a typical case, a ragged looking ulcer covered with a sloughing membrane, and the secretion when wiped off gives a very offensive odour. These cases are discovered accidentally and have been mistaken for lues, diphtheria, and even malignant disease. The course is rather slow and the best treatment is peroxide of hydrogen with which the ulcer is swabbed, and subsequently guaiacol.

Dr. K. Cameron: The case which I showed before the society some time ago was on the hard and soft palate and extended through

spaces between the teeth. Dr. Rhea diagnosed it. Salvarsan cleared the ulcer.

Dr. H. S. Birkett: I would like to ask why in some of these cases the use of neo-salvarsan has been of so much benefit?

Dr. L. J. Rhea: It has been considered by some that there is a definite relationship between the bacillus and the spirochæte and the use of salvarsan is adopted on that basis.

PATHOLOGICAL SPECIMENS: Series by Dr. L. J. Rhea:

1. Sarcoma of the larynx.

2. Diverticulum of urethra posterior to triangular ligament, extending as a narrow tube opening up into a diverticulum beneath the submucosa. Patient was struck with a brick, injury leading to extravasation of urine resulting in severe symptoms leading to death.

DISCUSSION: Dr. A. E. Garrow: What was the nature of the infection or were any cultures made?

Dr. M. Lautermann: The nature of the epithelium lining this diverticulum might determine whether it was congenital or acquired.

Dr. L. J. Rhea: The process was so extensive that there was no lining membrane left; the underlying tissue was also destroyed. The streptococcus was the primary infection.

CASE REPORTS: 1. *Lack of development of the membrana reuniens* followed by complete closure of the skin of the abdominal wall with ventral hernia, by Dr. R. E. Powell.

DISCUSSION: Dr. K. Cameron: I recently had a case of this nature; the child was born at eight months. Through an opening about one quarter inch to the right of the umbilicus the whole of the intestines protruded. I do not think the small intestines was more than a foot long; the colon was about three inches.

2. *Excision of the hip for tuberculosis*, by Dr. A. MacKenzie Forbes: The case illustrates the difficulty of knowing when, in the history of severe cases of tuberculosis of the hip, radical procedures should be adopted. Child of eight years who, two years previously, had pleurisy with effusion. December, 1912, brought to orthopedic outdoor department complaining of pain in hip of three weeks duration. Child poorly nourished; muscular spasm about hip, 45° flexion, some adduction, no fluctuation. Child anæsthetised, flexion reduced, hip immobilized in long plaster of Paris spika from nipple down to ankle. In March, 1913, admitted to Children's Hospital with increasing temperature, average 100°, foot swollen, spika removed. No fluctuation noticed and, instead

of atrophy, there was swelling of the hip, leg, and foot. A larger spika put on. In May spika had to be changed again on account of swelling. In September temperature improving, child's general health improving but, as again swelling indicated pressure from spika, it was removed and it was found that the thigh had increased one and a half inches more in circumference than the other; still no sign of abscess, just a general infiltration of the parts. In January, 1914, spika again removed and another search made for pus. Patient had no temperature and seemed to be in good condition. Another spika applied. Joint aspirated a couple of times, at first only a suggestion of pus, going deeper to the bone secured some. On May 7th, another examination was not effective and incision revealed dead bone. The neck, head, and great trochanter and upper part of the shaft had to be removed; even the medulla of the bone was very considerably invaded.

Here was a case in which it would have been better to have incised months ago and it teaches a lesson not to trust too much to temperature; that no matter what temperature a patient may be running suffering from tuberculosis of the hip, if we find generalized infiltration which does not disappear under rest and other general treatment, excision must be thought of. In the case of abscess it is our duty to incise and be prepared to excise.

DISCUSSION: Dr. S. Ortenberg: I should like to ask how frequently *x*-rays were taken of this case and of how much value these pictures would be in guiding one to operative interference in such cases.

Dr. Forbes: No *x*-rays were taken and I do not deny that if it had been possible to take *x*-rays from time to time during the treatment they might have been of much benefit. It is, however, almost impossible to make very much from *x*-rays taken through the plaster of Paris jackets used in this particular treatment.

3. Patent ductus arteriosus with infective pulmonary endocarditis. Drs. Maude E. Abbott and W. F. Hamilton. Dr. Hamilton read the case report and Dr. Abbott gave the pathological findings.

4. Duodenal diverticulum, by Dr. Fraser B. Gurd.

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